Additional Area 3 Investigations

The Lockformer Company
Lisle, Illinois

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1.0 INTRODUCTION

The field investigations to determine the extent of contamination associated with (and in the vicinity of) Area 3 at The Lockformer Company (Lockformer) a division of MetCoil Systems Corporation site, have recently been completed. These investigations were conducted to define the extent of contamination attributable to the Lockformer site. Representatives of Lockformer and the Illinois Environmental Protection Agency (Illinois EPA) have agreed that Lockformer will submit this report, which summarizes these investigations, on June 25, 2004. Discussions between the Illinois EPA and Lockformer while conducting these investigations have, in large part, defined the nature of the investigative efforts.

Some recent findings, particularly south of Area 3 on the Lockformer site, could impact future implementation and monitoring during groundwater remediation efforts. For this reason, the recent findings related to groundwater contamination occurrence at the south end of Area 3 are discussed in detail in Section 3.

1.1 PURPOSE

The purpose of this report is to present and interpret the results of additional data collection efforts performed within (and in the vicinity of) Area 3 since issuing the *Supplemental VOC Investigation Report for Area 3* (November 27, 2002).

1.2 METHOD OF STUDY

Numerous discussions took place between Illinois EPA personnel and Lockformer since the *Supplemental VOC Investigation Report for Area 3* (November 27, 2002) was issued. These discussions primarily focused on the determination of the lateral extent of contamination east and west of the Lockformer site in both soil and groundwater. The

majority of this additional study took place on the Ogden Corporate Center and Olsen properties to the west of Lockformer. Some additional work took place east of the Lockformer site on residential properties along Elm Street.

1.3 PREVIOUS STUDIES

This report is not intended as a stand-alone document. It is assumed the reviewer is familiar with the voluminous quantity of reporting performed to date on the site. In particular, it is assumed the reviewer is familiar with the following previously performed studies for the site:

- *Interim Investigation Report*. January 25, 2001. Volumes 1, 2, and 3. Clayton Group Services, Inc.
- *Comprehensive VOC Investigation Work Plan*. May 25, 2001. Clayton Group Services, Inc.
- *Comprehensive VOC Investigation Report*. May 10, 2002. Volumes 1, 2, 3, 4, 5, and 6. Clayton Group Services, Inc.
- *Lockformer Work Plan*. September 20, 2002 (Volume 1), December 13, 2001 (Volume 2), February 28, 2003 (Volume 3). Clayton Group Services, Inc.
- *Supplemental Comprehensive VOC Investigation Report (for Areas 1 and 2)*. October 18, 2002. Clayton Group Services, Inc.
- *Supplemental VOC Investigation Report for Area 3*. November 27, 2002. Clayton Group Services, Inc.
- *Remedial Action Plan for Areas 1 and 2*. July 7, 2003. Clayton Group Services, Inc.
- *Additional Area 1 and 2 Investigations and Remedial Objectives Report*. March 5, 2004. Clayton Group Services, Inc.

2.0 GEOLOGY

The most recent geologic investigations focused on defining the extent of groundwater contamination east and west of the Lockformer site. Discussions regarding the general nature of geologic conditions in the vicinity of the Lockformer Site can be reviewed in the reports and references listed in Section 1.4 of this report. Again, this report is not intended as a stand-alone report. It is assumed the reader has a general familiarity with these other reports on the Lockformer site. These reports also contain a large number of results of geotechnical lithologic analyses of non-carbonate organic carbon, grain-size, moisture content, specific gravity, bulk density, total porosity, air-filled porosity, and water-filled porosity. The results of these lithologic analyses are summarized and identified by lithologic unit in Table 2-1. These lithologic analyses are averaged and summarized by unit in Table 2-2. While much of this geotechnical lithologic analysis was performed on samples collected from Areas 1 and 2 at the Lockformer site, it is reasonable to expect they characterize the nature of these lithologic units (where present) in Area 3.

2.1 SITE GEOLOGY

The geology at and in the vicinity of Area 3 at the Lockformer site has been investigated by a large number of soil borings and groundwater monitoring wells. The geologic data collected from these soil borings and monitoring wells were compiled to create nine cross-sections that traverse Area 3 and adjacent properties. These cross-sections are presented on Figures 2-1, 2-2, 2-3, and 2-4. The cross-section reference map illustrating the traverse of each cross-section is provided on each of the respective figures. The general occurrence and nature of the lithologic units near the Lockformer site are discussed below using several of these cross-sections to aid in the characterization.

Cross-section B-B' on Figure 2-1 is a north-to-south traverse from Area 2 at the Lockformer site to Front Street south of the Burlington Northern Santa Fe (BNSF) railroad tracks and St. Joseph Creek. It illustrates the transition of lithologies from north to south across the Lockformer site. At the north end of cross-section B-B' near monitoring well nests MW-1102S and MW-1102D, the upper silty clay glacial till is approximately 19 feet thick. The upper till at this location is underlain by the mass waste sand and gravel, which is also approximately 19 feet thick. The mass waste sand and gravel is, in turn, underlain by the lower till, which is approximately 27 feet at this location. The lower till can be seen to contain an interbedded, 8-foot-thick silt lithology at this location. The weathered Silurian dolomite surface is encountered at an approximate depth of 64 feet, and competent dolomite was encountered at a depth of 74 feet.

Proceeding south through Area 3 of the Lockformer site along cross-section B-B' to the vicinity of monitoring well MW-1119 between the Lockformer detention basin and the BNSF railroad tracks, it can be observed that significant lithologic change takes place. At this southern property boundary location of Area 3, the upper till and the lower till units have pinched out leaving the mass waste sand and gravel exposed at surface grade with only a thin veneer of surficial soil. At its base, the mass waste sand and gravel is in direct contact with the Silurian dolomite. While geologic data are not available for the residential properties on the north side of Front Street, the geologic data south of the BNSF railroad tracks suggest the upper till is again present, but the mass waste sand and gravel unit and interbedded coarse-grained lithologies associated with it are still in direct contact with the Silurian dolomite.

A review of north-to-south cross-sections A-A' and I-I' on Figure 2-2 along the west side of the Lockformer site and along the west property boundary of the Ogden Corporate Center site indicate a similar general transition of lithologies from north to south.

Likewise, a review of north-to-south cross-sections C-C' and H-H' on Figure 2-3 indicate a similar transition of geologic conditions east of the Lockformer site.

Figure 2-4 displays east-to-west cross-sections D-D', E-E', and F-F' across the south end of Area 3 and south of the BNSF railroad tracks. These cross-sections exhibit that east of monitoring well nest MW-1115S/M/D the lower till is, for the most part, non-existent. The eastward extent to which the lower till is not in existence was not determined fully due to several borings not penetrating to that depth. However, it would appear the lower till is missing at least as far as CSB-2303 on cross-section F-F'. A thin veneer of lower till was encountered at monitoring well nest MW-2100S/M/D. While the data are not complete for cross-section D-D' because monitoring wells MW-2101, MW-2102, and MW-2103 were not completed to sufficient depth, it is likely the lower till probably pinches out near these wells. The lower till was not encountered in any of the soil borings or monitoring wells that penetrated to the depth of bedrock along cross-section F-F' south of the BNSF railroad tracks.

South of the BNSF railroad tracks along cross-section F-F', a moderately well sorted fine-grained sand occurs immediately above the Silurian dolomite and below the mass waste sand and gravel sediments. This same fine-grained sand occurs along Front Street and can be observed in cross-section E-E' on Figure 2.4.7-7 of the *Comprehensive VOC Investigation Report*, (May 10, 2002). This sand is generally attributed to an interbedded sequence of the alluvial deposits associated with the St. Joseph Creek valley train.

2.2 SOIL SAMPLING RESULTS

Additional soil sampling was performed in (and adjacent to) Area 3 at Lockformer to determine the extent of contamination above the water table exceeding Tier I standards. This soil sampling took place in three primary areas:

- Soil sampling was performed on the Ogden Corporate Center and Olsen properties west of Lockformer to determine the nature of any releases from the sanitary sewer system that runs east-west across the south end of Area 3 and the Ogden Corporate Center site, and the extension of this line where it turns and runs north toward Ogden Avenue just west of the west Ogden Corporate Center property boundary.

- Soil sampling was performed in the northeast portion of Area 3 to determine the nature of impacts from leaks in the north-south sanitary sewer near monitoring well nest MW-1113S/M/D on the Lockformer property.

- Soil sampling was performed east of Area 3 at the Lockformer site along the West Avenue right-of-way and on residential properties along Elm Street to determine the nature of any release from the north-south sanitary sewer system that exists on the east side of Area 3.

The results of soil sampling west of Area 3 on the Ogden Corporate Center and Olsen properties can be reviewed on cross-sections E-E' and D-D' on Figure 2-4 and I-I' on Figure 2-2. The results of this soil sampling indicate only one sample exceeded a Tier I soil objective. That sample occurred at 20 to 22 feet in depth in soil boring CSB-2137 and exhibited a trichloroethene (TCE) concentration of 78.8 micrograms per kilogram (ug/kg). This sample is believed to be impacted by releases from the north-south sanitary sewer at this location west of the west Ogden Corporate Center property boundary.

Soil sampling was performed in the northeast portion of Area 3 to define the area immediately around the north-south sanitary sewer line where leaks have occurred and can be reviewed on cross-section G-G' on Figure 2-1. A review of cross-section G-G', which exhibits the soil sampling results for borings performed directly adjacent to the sewer line, indicate the leak was determined to have occurred between soil boring CSB-2143 and sanitary manhole E (depicted on Figure 2-1). Soil and groundwater samples collected along this section of the sanitary sewer line exhibit elevated concentrations of TCE.

Cross-sections C-C' and H-H', Figure 2-3, illustrate the results of soil sampling performed east of Area 3 at the Lockformer site. Soil sampling results here indicate that

four samples obtained along West Avenue exceeded the Tiered Approach to Corrective Action Objectives (TACO) Tier I standard for TCE. All other soil sampling east of Area 3 indicated concentrations of constituents less than the TACO standards. The elevated TCE soil sample determination of 3,340 ug/kg at soil boring CSB-2116 and the lesser concentration of 61 ug/kg at CSB-2115 are believed to be associated with releases from the north-south sanitary sewer line near manhole E. The TCE concentration determined in samples from soil boring CSB-2104 on the right side of cross-section C-C' in the Burlington Avenue right-of-way were analyzed by an in-field, mobile gas chromatograph utilizing SW-846 method 5021. As discussed in the *Comprehensive VOC Investigation Report* (May 10, 2002), the TCE and tetrachloroethene (PCE) analytical results from this soil boring and the majority of the soil borings performed along the east-west sanitary sewer line at the south end of Area 3 on the Lockformer site (and presented in cross-section E-E' on Figure 2-4) were analyzed in the field by gas chromatograph method 5021 and appear to be overestimated by as much as a factor of 10 when compared to duplicate results for samples analyzed by the fixed laboratory.

3.0 HYDROGEOLOGY

Detailed discussions regarding the hydrogeology and nature of hydrostratigraphic units at and near the Lockformer site have been discussed in several of the reports identified in Section 1.4. Recently, two potentiometric surface maps of the Silurian dolomite aquifer have been prepared for the semi-regional area around the Lockformer site and were presented in the report entitled *Additional Area 1 and 2 Investigations and Remedial Objectives Report* (March 5, 2004). The July 2003 potentiometric surface map for the Silurian dolomite aquifer is provided as Figure 3-1 in that report (March 5, 2004). The February 2004 potentiometric surface map for the Silurian dolomite aquifer is provided as Figure 3-2 of that report (March 5, 2004). The measurements appearing on Figure 3-1 were obtained on July 7, 2003. The measurements appearing on Figure 3-2 were obtained on February 3 and 4, 2004. The potentiometric contours during both measurement periods indicate a southeast flow in the Silurian dolomite aquifer over the semi-regional area.

3.1 SITE HYDROGEOLOGY

Eighteen (18) monitoring wells were installed to further investigate hydrogeologic conditions and the occurrence of groundwater contamination near Area 3 at the Lockformer site since issuing the *Supplemental VOC Investigation Report for Area 3* (November 27, 2002). Two monitoring wells (MW-1119S and MW-1119M) were installed on the south property boundary of Area 3. Four monitoring wells were installed along the south property boundary of the Ogden Corporate Center property: MW-2130S, MW-2130D, MW-2131S, and MW-2131D. One monitoring well (MW-2129) was installed along the west property boundary of the Ogden Corporate Center. Two wells were installed east of Area 3 along the West Avenue right-of-way: MW-2116 and MW-2114. Nine monitoring wells were installed south of the BNSF railroad tracks and north of St. Joseph Creek. These wells are: MW-2300S, MW-2300M, MW-2300D,

MW-2301S, MW-2301M, MW-2301D, MW-2306, MW-2311S, MW-2312S, and MW-2312M. In addition to the 18 monitoring wells installed, a large number of soil borings were advanced across the study area to define hydrogeologic conditions and to collect soil and groundwater grab samples.

Static water level measurements from the available groundwater monitoring wells available throughout the period of study were used to develop a series of potentiometric surface maps for the glacial sediments near the Lockformer site. All the static water levels and surface water gauging station measurements collected at the site to date are summarized in Table 3-1. Figure 3-1 presents the potentiometric surface map for the glacial sediments on November 8, 2002. Figure 3-2 presents the potentiometric surface map for the glacial sediments on March 28, 2003. Figure 3-3 presents the potentiometric surface map for the glacial sediments on July 7, 2003. Figure 3-4 presents the potentiometric surface map for the glacial sediments on February 4, 2004. Figure 3-5 presents the potentiometric surface map for the glacial sediments on June 1, 2004. Figure 3-6 presents the potentiometric surface map for the glacial sediments on June 21, 2004. Potentiometric surface maps were not developed for the September 24, 2003 data due to inaccessibility of data on the Ogden Corporate Center property. These potentiometric surface maps for the glacial sediments in Area 3 (and south of there) indicate a variable groundwater flow direction from southwest to southeast.

Static water level measurements from the groundwater monitoring wells available throughout the period of study were used to develop a series of potentiometric surface maps for the Silurian dolomite near the Lockformer site. All the static water levels and surface water gauge station measurements used to develop these figures are identified in Table 3-1. Figure 3-7 presents the potentiometric surface map for the Silurian dolomite on November 8, 2002. Figure 3-8 presents the potentiometric surface map for the Silurian dolomite on March 28, 2003. Figure 3-9 presents the potentiometric surface map for the Silurian dolomite on July 7, 2003. Figure 3-10 presents the potentiometric surface

map for the Silurian dolomite on February 4, 2004. Figure 3-11 presents the potentiometric surface map for the Silurian dolomite on June 1, 2004. Figure 3-12 presents the potentiometric surface map for the Silurian dolomite on June 21, 2004. Potentiometric surface maps were not developed for the Silurian dolomite on the September 24, 2003 measurement date due to inaccessibility of data on the Ogden Corporate Center property. These potentiometric surface maps for the Silurian dolomite in Area 3 (and south of there) indicate a groundwater flow direction that varies from southeast to south-southeast.

A review of the potentiometric surface maps for the glacial sediments at the Lockformer site indicates a significantly different flow field in the southern portion of Area 3 and area south of the Lockformer site when compared to the flow in Area 2 and the northern portion of Area 3. Two significant occurrences near the south end of the Lockformer site are likely to account for this. One significant influence on the groundwater flow field in this area is related to the absence of the lower till unit, and the subsequent groundwater occurrence within the mass waste sand and gravel being in direct hydraulic connection with the Silurian dolomite. The other significant influence on the groundwater flow field in this area is related to the groundwater mound south of the BNSF railroad tracks likely caused by the leaking Downers Grove Sanitary District (DGSD) 42-inch discharge line and siphon box. This occurrence of a significant groundwater mound adjacent to the DGSD 42-inch discharge line and siphon box has come to light only recently after installation of groundwater monitoring wells MW-2312S and MW-2312M adjacent to the siphon box south of the BNSF railroad tracks and north of St. Joseph Creek. However, it is fair to say this groundwater mound is likely to have had a significant influence on groundwater flow in the area for a long period even though it was only recently discovered.

An analysis of the variability in the groundwater flow field between the south end of Area 3 (and areas south of there) and Area 2 at the Lockformer site is available through

an analysis of the hydraulic gradients measured to date at the site. As identified in the *Additional Area 1 and 2 Investigations and Remedial Objectives Report* (March 5, 2004), the hydraulic gradient on the east side of the structural high in the lower till surface has been measured to average approximately 0.0028 over the period of study. North of the structural high in the lower till on the west side of Area 2, the average hydraulic gradient has been approximately 0.0016 over the period of study. The lower till is present over the entirety of the Areas 1 and 2 and the northern portion of Area 3.

South of monitoring well nest MW-1113S/M/D, measurement of the hydraulic gradient in the glacial sediments is complicated by the occurrence of the groundwater mound associated with the DGSD 42-inch discharge line. However, a good approximation of the hydraulic gradient over the area can be made through utilizing the potentiometric contours occurring closest to monitoring well MW-1113S/M/D and along Front Street on Figures 3-1, 3-2, 3-3, 3-4, 3-5, and 3-6. Using this methodology to calculate the hydraulic gradient between monitoring well MW-1113S/M/D and Front Street, the hydraulic gradient over the period of study has ranged from 0.00038 to 0.0012 and averaged 0.00071.

Measurement of the hydraulic gradient in the Silurian dolomite is also complicated by the groundwater mound occurrence south of the BNSF railroad tracks. Potentiometric surface maps developed from static water level measurements performed after monitoring wells south of the BNSF railroad tracks were installed indicate a more complicated groundwater flow field in the dolomite with a strong eastward component of flow. However, using a similar method of analysis to that described above for the glacial sediments, the hydraulic gradient in the Silurian dolomite can be estimated. On this basis, the hydraulic gradient in the Silurian dolomite ranged from 0.00039 to 0.00053 over the period of study and averaged 0.00046.

A comparison of the average hydraulic gradient determined for the glacial sediments over the southern portion of Area 3 to Front Street (0.00071) to the hydraulic gradient determined for the Silurian dolomite over this same area (0.00046) suggests the gradients are reasonably similar, and that a good hydraulic connection occurs between the glacial sediments and the bedrock. The difference in the two hydrostratigraphic units' hydraulic gradient is likely attributable to variable effects related to the groundwater mound within the area.

The foregoing description of site geology and groundwater flow results in the observation that the lower till, which occurs over the entirety of Areas 1 and 2 and the northern portion of Area 3, acts as an aquitard to cause the groundwater flow in the mass waste sand and gravel to be independent of the groundwater flow in the Silurian dolomite. In the southern portion of Area 3 and areas south to Front Street, the lower till is absent, and the groundwater occurrence in the glacial sediments is in direct hydraulic connection with the Silurian dolomite. This analysis suggests that in the presence of a large groundwater mound like the one determined to be present beneath the DGSD 42-inch sewer line south of the BNSF railroad tracks, elevated vertical gradients should be present between groundwater occurring in the glacial sediments and the Silurian dolomite, causing the groundwater in the glacial sediments to flow downward into the bedrock. A review of the static water levels for monitoring wells nests MW-2300S/D and MW-2301S/D, and the newly installed monitoring well nest adjacent to the DGSD siphon box, MW-2312S/M in Table 3-1 indicates this is the case. In fact, the vertical head difference measured between the MW-2312S and MW-2312M was over five feet during the one measurement event available before submission of this report. This suggests a large amount of leakage in this area. A calculation of the vertical gradient at these two well nests, MW-2300S/D and MW-2300S/D, for the four measurement events after these wells were installed suggests the vertical gradient has ranged from 0.003 to 0.01, and averaged 0.0044 (as measured from the center of their well screens or corehole). These data suggest the downward vertical gradient south of the BNSF railroad tracks is

approximately an order of magnitude greater than the horizontal hydraulic gradient in this area.

Other vertical hydraulic gradient analysis available for the study area includes the line of well nests along the south end of Area 3 on the Lockformer property and the adjacent Ogden Corporate Center property. A review of the static water level data in Table 3-1 for the well nests along the south property boundaries of Lockformer and the Ogden Corporate Center indicates some variability, but the data suggest a prevailing upward vertical gradient from the Silurian dolomite to the glacial sediments during the period of study.

At the time of this report submittal, there are two hydraulic conductivity determinations available in Area 3. These hydraulic conductivity measurements were performed by slug testing monitoring wells MW-1113S and MW-1113M. The results of these slug tests are provided in Appendix A. The results for monitoring well MW-1113S, completed in the saturated mass waste sand and gravel sediments in the northern portion of Area 3, suggests a hydraulic conductivity value of approximately 1.6×10^{-3} cm/sec. This value is in good agreement with the lognormal average of 1.52×10^{-3} cm/sec determined for slug tests performed in Areas 1 and 2 of the site.

The presence of the groundwater mound associated with the DGSD 42-inch sewer line south of the BNSF railroad tracks and the variability of glacial sediments at the south end of Area 3 and areas to the south make it difficult to analytically estimate the groundwater flow velocity in the glacial sediments with the data currently available. However, a groundwater flow velocity estimate for glacial sediments in that portion of Area 3 between monitoring well MW-1113S and MW2102 appears less impacted by the groundwater mound and exhibits consistent mass waste sand and gravel lithologies. By assigning a reasonable value for the effective porosity of the mass waste unit sediments of 0.25, a calculation of the average linear groundwater velocity can be made. For the

central portion of Area 3 between MW-1113S and MW-2102 where the hydraulic gradient has averaged 0.0015 during the period of study, the average linear groundwater velocity is approximately 10 feet per year:

V = k * I * 1/n
K = hydraulic conductivity, 1.6 x 10^{-3} cm/sec or 4.5 ft/day
I = hydraulic gradient, 0.0015
N = porosity, 0.25
V = 4.5 ft/day * 0.0015 * 1/0.25 = 0.027 ft/day or 10 ft/yr

3.2 GROUNDWATER RESULTS

The most recent volatile organic compound (VOC) analytical results (determined by SW-846 method 8260b) for groundwater monitoring wells and groundwater grab samples in Area 3 are summarized on Figure 3-13. This figure identifies all detected compounds during groundwater sampling. Table 3-2 provides the results of groundwater general chemistry analyses from groundwater monitoring wells across the study area. As indicated in the May 20, 2004 Technical Memo titled *The Pilot Test Work Plan for Areas 1 & 2 to assess the implementation of full-scale biological treatment of the chlorinated solvents impacting the mass waste unit groundwater and the lower till*, groundwater saturating the unconsolidated glacial sediments exhibits aerobic conditions (dissolved oxygen concentrations greater than 0.5 parts per million [ppm] and positive Eh values), and groundwater in the Silurian dolomite exhibits anaerobic conditions (dissolved oxygen concentrations less than 0.5 ppm and negative Eh values).

3.2.1 Discussion of Groundwater Results

An analysis of groundwater contaminant transport results at (and in the vicinity of) Area 3 at the Lockformer site is complicated by the following hydrogeologic factors:

- The lower till unit pinching out toward the south end of Area 3 to allow the water table condition in the glacial sediments to be in direct hydraulic connection with the Silurian dolomite groundwater system.

- The existence of the groundwater mound determined to be present adjacent to the DGSD 42-inch discharge line and siphon box south of the BNSF railroad tracks.

- The flow of St. Joseph Creek through this area where it typically exhibits a pool elevation approximately 10 feet higher than the water table condition in the glacial sediments below it.

To date, Lockformer has been identified by the Illinois EPA and the United States Environmental Protection Agency (USEPA) as single-handedly contaminating the Silurian dolomite aquifer with TCE for over two miles downgradient of its south property boundary. This is one of the longest VOC contaminant plumes known to be in existence anywhere (Wiedemeier et al., 1999). However, soil and groundwater data from the Lockformer site that support the premise that Lockformer is the alleged sole cause of this 2-mile VOC plume is simply not in existence, even though Lockformer has performed every investigation at its site requested by the Illinois EPA and the USEPA. Lockformer certainly has had releases of chlorinated VOCs on its property that have migrated from soil to groundwater, and in the case of Area 3, caused groundwater contamination downgradient of its site. However, the data to support the allegation that Lockformer is the sole cause of this 2-mile TCE plume is simply not existent.

A review of Figure 3-6, the most recent potentiometric surface map for the glacial sediments in the vicinity of the Lockformer site (developed on June 21, 2004), includes the new groundwater monitoring wells installed adjacent to the DGSD siphon box and 42-inch discharge line on the BNSF property. The static water level data collected on this date indicate the presence of a large groundwater mound under the DGSD siphon box and 42-inch discharge line. The static water level data collected from monitoring wells on this date indicate the groundwater mound propagates away from the location of the DGSD siphon box in an approximate radial fashion. The potentiometric surface maps

developed for the glacial sediments near the Lockformer site since the installation of monitoring wells on the BNSF property (Figures 3-3, 3-5, and 3-6) all indicate the presence of a groundwater mound. The static water level data collected prior to monitoring well installation on the BNSF property also supports the groundwater mound existence.

Data collected to date indicate that both the DGSD siphon box and the 42-inch discharge line contribute to this groundwater mound. The static water level data collected from monitoring wells MW-2312S and MW-2312M document the DGSD siphon box leakage. The DGSD 42-inch discharge line is known to have leaked historically based on the following documentation:

- Soil and groundwater data collected under the DGSD 42-inch discharge line and along its length exhibit concentrations of PCE and trichloroethane (TCA) in soil below the 42-inch discharge line but above the water table. These data can be reviewed on Figure 3-14.

- Groundwater under the DGSD 42-inch discharge line exhibits the effects of mounding due to leakage and exhibits the highest concentration of TCA determined in the water table aquifer at (and in the vicinity of) the Lockformer site (MW-2301S and MW-2301M). These data can be reviewed on Figure 3-14.

- Soils below the DGSD 42-inch line exhibit the impacts of other chemical contaminants that leaked from the line. These contaminants include 1,2,3-trichlorobenzene, 1,2,4-trichlorobenzene, 1,3,5-trimethylbenzene, naphthalene, n-butylbenzene, p-isopropyltoluene, sec-butylbenzene, and hexane. These contaminants have not been identified in any soil or groundwater samples analyzed at the Lockformer site.

- The DGSD 42-inch discharge line is constructed with sections of pipe that are 5 feet in length. The occurrence of pipe joints every 5 feet along the length of the 42-inch discharge line has caused DGSD to perform regular root removal maintenance for many years on the section of 42-inch line leading from the sewage treatment plant to the siphon box where it crosses St. Joseph Creek (personal communication, Ken Roske, DGSD). These roots have grown into the pipe at the pipe joints and caused the pipe to leak along this section of the discharge line. The DGSD effluent discharge sewer is known to have been in such a state of disrepair that, in 1996, the DGSD informed the Illinois EPA they were considering the feasibility of discharging directly

to St. Joseph Creek and discontinuing the use of the effluent discharge sewer (DGSD letter to Illinois EPA Permit Section, January 10, 1996). Some time shortly before the spring of 2001, the DGSD rebuilt several of the manholes along the section of the 42-inch discharge pipe immediately south of the Lockformer site, suggesting these manholes were in a state of disrepair.

- Videotape of the 42-inch discharge line from 2001 indicates that the portion of the discharge line from approximately I-355 to the siphon box at St. Joseph Creek was significantly impacted with root intrusion. The remainder of this discharge line video west of St. Joseph Creek to the discharge point at the East Branch of the DuPage River (over a mile away) indicates this section of the discharge line was relatively free of root intrusion.

In addition to the 2001 videotape of the DGSD discharge line, Lockformer was provided a brief videotape and narrative of the siphon box investigation from 1994. The narrative supplied with this videotape of the siphon box indicates both the east and west siphon boxes were leaking and had holes in them "the size of your thumb" through which the personnel producing the videotape could "push a stick through."

On October 15, 1986, the Illinois EPA issued the DGSD the National Pollution Discharge Elimination System (NPDES) permit that included the pretreatment standards required by the USEPA in 40 CFR, Part 35, Subpart E, Appendix D-1, March 4, 1976. The DGSD NPDES permit required them to report to the Illinois EPA on an annual basis sample results of VOC analyses taken of the DGSD influent, effluent, and sludge. In 1994, the annual report the DGSD submitted to the Illinois EPA indicated their final sludge contained 130 mg/kg TCE, 35 mg/kg TCA, and 12 mg/kg PCE. This sample was a composite probably taken of the sludge in the sludge drying beds at the facility. These 1994 sludge sampling results, as well as the multiple other yearly reports that document TCE, TCA, and PCE concentrations in the DGSD sludge, indicate large volumes of TCE, TCA, and PCE were being discharged to the DGSD.

The influent and effluent concentrations for the 1994 reporting period were determined to be non-detect for TCE, TCA, and PCE. However, comparing the influent and effluent

sample analyses to the sludge analyses is like comparing apples to oranges. For instance, DGSD data indicate the residence time of the sludges in the anaerobic digester alone is on the order of 42 to 67 days. On the other hand, the water residence time through the entire treatment system is approximately 20 hours. These data suggest large slugs of TCE, TCA, and PCE were being discharged to the DGSD treatment plant as evidenced by the sludge. Even though the annual reporting of the effluent analyses never reported detectable concentrations of TCE, TCA, and PCE, the annual sampling of the influent and effluent was not sufficient to identify the specific occurrences associated with these large discharges from industry within the Ellsworth Industrial District.

The elevated concentrations of TCE, TCA, and PCE determined to be present in the DGSD sludges indicate large volumes of these compounds were discharged to the DGSD treatment plant at high concentrations. The aeration treatment within the DGSD treatment plant was not designed to (and was not capable of) strip these compounds from the water stream efficiently. It is documented that TCA and PCE have leaked out of the 42-inch discharge line and siphon box to contaminate soils and groundwater under them. It is documented that the DGSD siphon box has been leaking significantly since at least 1994 and has probably been leaking for a much longer period. These facts alone result in a conclusion that the DGSD 42-inch line and siphon box have contributed TCE, TCA, and PCE contamination to groundwater south of the Lockformer site.

Over and above these facts, the following information is offered to support this conclusion:

- Use of TCE, TCA, and PCE by industry in Ellsworth Industrial District is documented to date back to the late 1950s.
- There were no pretreatment standards for industrial discharges to the DGSD before 1986; there were no VOC analyses performed by the DGSD on any of its sludge or waste prior to 1986; the DGSD has no documentation of ever sampling the specific discharge from any industrial facility within Ellsworth Industrial District and analyzing it for VOCs.

- By 1985, the Illinois EPA records show that public water supply wells within Downers Grove had already been impacted by TCE, TCA, and PCE, documenting the misuse and handling practices of these compounds by the industries within Ellsworth Industrial District.

A characterization of groundwater impacts resulting from historic sanitary sewer discharges from within the Lockformer facility is available from a review of the soil and groundwater data collected from the leak around manhole E in the northeast portion of Area 3. While this sanitary sewer line has received residential and commercial discharges to the northeast of the Lockformer facility, it is fair to say this sewer would have had to convey all discharges from the Lockformer manufacturing facility to the east-west sanitary sewer line at the south end of Area 3. As a result, leakage from the north-south sanitary sewer in the northeast portion of Area 3 should provide the best characterization of the discharges from the Lockformer facility itself. A review of the soil sampling data on cross-section G-G' on Figure 2-1 and the groundwater analyses from this area on Figure 3-13 indicate the soils and groundwater are impacted with PCE and TCE and their daughter products and are not impacted by TCA. In fact, groundwater occurring in the glacial sediments to the south-southwest of manhole E appears to impacted by a groundwater contamination plume specifically from this area. Upon release from the north-south sanitary sewer near manhole E, some contaminants migrated to the east across the unsaturated, upper surface of the lower till before entering the groundwater saturating the glacial sediments in this area. The southern groundwater flow from this eastern migration has caused a bifurcated groundwater plume with two lobes. One lobe generated from the leaks migrated across the upper surface of the lower till onto the Elm Street residential properties and then flowed to the south in groundwater. The other migrated directly to the south-southwest in groundwater from the vicinity of manhole E. The approximate outline of this independent bifurcated plume is characterized on Figure 3-13.

Based on discussions with Lockformer personnel (personal communication, Rian Scheel and Gary Dickinson), Lockformer used TCA as a degreaser within the facility for a short period from in approximately1987. The TCA was inadvertently delivered to Lockformer instead of TCE, and immediately caused noticeable problems within the degreaser. Problems with degreasing were quickly identified when paint adherence problems began to occur simultaneously. Lockformer then questioned their solvent supplier and determined they had inadvertently received TCA instead of TCE.

This is important because personal interviews and court testimony by Lockformer employees indicate the majority, if not all, of the solvent discharges from the facility manufacturing process to the sanitary sewer were the result of cleaning operations related to the degreaser prior to these wastes being regulated as a hazardous waste. As identified in the Lockformer 104(e) response to the USEPA, prior to 1986, the vapor degreaser unit was cleaned periodically, and the cleaning residuals were discharged to the sanitary sewer. After that time, wastes from cleaning the degreaser were sent offsite for recycling, and a distillation unit for the TCE was installed a short time thereafter. Since TCA was used after this period, it was not discharged to the sanitary sewer. As a result of this, limited TCA concentrations do occur in shallow soils as a result of spills near the former fill pipe for the roof-mounted tank. However, TCA was not discharged to the sanitary sewer by plant operations related to cleaning the degreaser, and does not occur in soil or groundwater near the leak along the north-south sanitary sewer near manhole E.

The observation that leaks near manhole E along the north-south sanitary sewer document the historic discharges from the Lockformer manufacturing processes appear corroborated by the evaluation of contaminant transport processes in groundwater from the area of this leak in the northeast portion of Area 3. The TCE plume migration that could be expected to have occurred from the north-south sanitary sewer leaking near manhole E for the period of Lockformer operation (35 years) can be estimated using the average linear groundwater velocity values identified in Section 3.1 for the area between

MW-1113S and MW-2102, and the following additional contaminant transport parameterization:

- A spatially variable source concentration with center concentration of 420 micrograms per liter (ug/L) (from the groundwater grab sample acquired at CSB-2147 and concentration in MW-1113S of 415 ug/L) and source thickness of 2 feet and width of 40 feet.
- A source zone halo exhibiting a concentration of 50 ug/L that is 100 feet in width and 2 feet thick.
- Bulk density for the mass waste sand and gravel of 1.6 kg/L.
- The average fraction of organic carbon determined for the mass waste unit sediments in Table 2-2 of 0.265%.
- Longitudinal dispersivity of 30 feet and transverse dispersivity of 3 feet.
- Partition coefficient for TCE of 100 l/kg.
- No decay simulated.

The analytical spreadsheet model BIOCHLOR (version 2.0) based on the Domenico equations was used to perform the analysis. A printout of this TCE contaminant transport modeling analysis is provided as Appendix B. The printout of the modeling results is composed of three sheets. The first sheet identifies the data input into the model and includes a section for field data input for comparison purposes. The field data input was developed from the downgradient groundwater grab samples and monitoring wells in the plume and are identified as CSB-1922 with a concentration of 317 ug/L at 80 feet, MW-125 with a concentration of 303 ug/L at 120 feet, CSB-1923 with a concentration of 260 ug/L at 130 feet, and MW-2102 with a concentration of 73 ug/L at 290 feet from the source. The second sheet of the modeling results provides the concentration array of the TCE plume. The third sheet of the modeling results provides a graph of the concentration of the TCE along the centerline versus the distance from the source for the predicted and field measured concentrations.

The results of the BIOCHLOR modeling analysis suggest a good agreement between the observed site contaminant transport data and the contaminant transport model utilizing site-specific parameterization measured for the site. The resulting conclusion suggests soil and groundwater data from the north-south sanitary sewer leaks near manhole E are representative of discharges from the Lockformer manufacturing facility to the sanitary sewers throughout the operational history of the facility.

Six groundwater monitoring well nests are located along the south end of Area 3 at the Lockformer site and on the adjacent Ogden Corporate Center Property to the west. These six well nests are located within a few feet of the east-west sanitary sewer line located there. Static water levels have been acquired from the wells in this area on 11 occasions since November 2001 when wells were first installed in this portion of Area 3. These static water levels were used to develop the potentiometric surface maps for the site provided in this report and for the reports identified in Section 1.3. Not once during any of these measurements has there been any indication of a groundwater mound or additional recharge being noted from the east-west sanitary sewer line on the Lockformer property. In fact, the hydraulic gradient over this portion of the study area is very flat as discussed in Section 3.1. This would suggest there is no substantial leakage from the east-west sanitary sewer line at the south end of Area 3 on the Lockformer property. Since the manufacturing processes and water discharge from the Lockformer facility have remained essentially unchanged through time, and there are actually greater residential and commercial discharges through this line today than in previous years, there is no reason to believe there would have been greater leakage from this east-west line at the south end of Area 3 in years past.

The investigations at the south end of Area 3 at the Lockformer site have documented the occurrence of TCE and PCE in soil under the east-west sanitary sewer line and above the water table indicating historic leakage from the sewer. The highest concentrations of TCE determined to occur in soil in this area were found at soil boring CSB-1562 at a

depth immediately above the water table. These samples occurred at depths of 22 to 24 feet and 24 to 26 feet and exhibited TCE concentrations of 1.694 mg/kg and 1,092 mg/kg, respectively (by field GC). The highest concentration of any groundwater sample determined to date in the glacial sediments at the south end of Area 3 on the Lockformer site immediately below the east-west sanitary sewer line is 91.3 ug/L. The highest concentration exhibited by any sample collected to date in the bedrock at the south end of Area 3 on the Lockformer site has occurred in a double packer sample acquired from the corehole interval from 85 to 93 feet in depth at MW-1119D. This double packer sample exhibited a TCE concentration of 2.3 ug/L.

An assessment of the soil and groundwater data collected in Area 3 at the Lockformer site suggests none of the typical indicators of dense non-aqueous phase liquid (DNAPL) occurrence for TCE, TCA, or PCE are present. Irrespective of the accuracy of the field GC soil data collected along the south end of Area 3 (recall that the fixed lab duplicates for these data suggest the field GC results may indicate concentrations up to an order to magnitude too high), the soil and groundwater data collected here do not indicate the presence of a significant amount of DNAPL in this area. Alternatively, the data at the south end of Area 3 on the Lockformer site suggest a low concentration source in the unsaturated zone soils slowly contributing mass to the groundwater system.

This is not a sufficient source area to have created the TCE groundwater contamination observed for over two miles south of the Lockformer site. To quantify the source term necessary to create such a groundwater contamination event, we can look at the work already performed by the plaintiffs' expert witness in the LeClercq et al. v. Lockformer, and Mejdrech et al. v. Lockformer (while disavowing any inference as to the accuracy of this modeling or the opinions reached thereupon). The model used to create this plume of TCE for over 2 miles south of the Lockformer site had a 10-meter-wide (32.8 feet) by 2-meter-thick (6.56 feet) source area in the groundwater system, with constant source addition of 500 mg/L to the groundwater for the 30+ years of operation by the facility.

This example is cited to quantify the type of source area mass that would be necessary to create such a groundwater plume. Such a source area simply does not exist on the Lockformer site, and there is not enough mass in soil and groundwater on the Lockformer site to have created such a plume.

Alternatively, because of the reasons identified above, it is more likely the DGSD treatment plant has received large quantities of TCE, TCA, and PCE from industrial discharges from the Ellsworth Industrial District (that it was not designed to treat) since the late 1950s and subsequently discharged those contaminants through the treatment facility to the 42-inch line and siphon box. Recent groundwater monitoring adjacent to the DGSD 42-inch line and siphon box indicates these structures provide significant continuous leakage to the subsurface, and it is reasonable to conclude this leakage has exhibited elevated concentrations of TCE, TCA, and PCE over time. Given that, a large volume of continuous discharge over time, exhibiting elevated concentrations of TCE, PCE, and TCA, would be the only way to account for the additional mass necessary to create the 2-mile plume allegedly observed, discharges from the DGSD must be considered as a contributor to the plume.

Current site data that further support the observations above include the groundwater analyses from monitoring wells completed in the glacial sediments along Front Street. The data Figure 3-13 indicates the well furthest to the west, MW-1603, exhibits the highest concentration of TCE at 5.9 ug/L. The center monitoring well along Front Street, MW-1604, exhibits a TCE concentration of 4.4 ug/L. The monitoring well furthest to the east along Front Street, MW-1605, has been determined to be non-detect for TCE. A review of the groundwater flow on any of the recent potentiometric surface maps (developed since wells have been installed on the BNSF property) documenting the groundwater mound in the glacial sediments (Figures 3-3, 3-4, 3-5, and 3-6) indicates this shallow groundwater contamination on the west end of Front Street is difficult to explain

by a source on the Lockformer site. Alternatively, monitoring wells MW-1603 and MW-1604 appear directly downgradient of the groundwater mound at the siphon box. The discussion provided above related to offsite groundwater contamination south of Area 3 could impact future operation and monitoring of the anticipated groundwater remediation efforts in Area 3 of the Lockformer site. Anticipating further data collection in the south portion of Area 3 (and areas south of it) during the anticipated pilot testing and remediation system installation, it is likely that additional data will come to light that will need to be factored into the discussions provided above related to the occurrence of groundwater contamination in this area. For this reason, Lockformer felt it was necessary to discuss these issues at this time in order make discussion related to remediation system installation at the site as efficient as possible.

4.0 REFERENCES

Downers Grove Sanitary District. January 10, 1996. Letter to IEPA Permit Section. From: Larry Cox, To: Thomas McSwiggin.

Personal Communication. Ken Roske. Downers Grove Sanitary District. June 2003.

Wiedemeier, Todd H. et al. 1999. *Natural Attenuation of Fuels and Chlorinated Solvents in the Subsurface.* John Wiley & Sons, Inc.

FIGURES

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FIGURES – 2-1 to 2-4; 3-13 to 3-14

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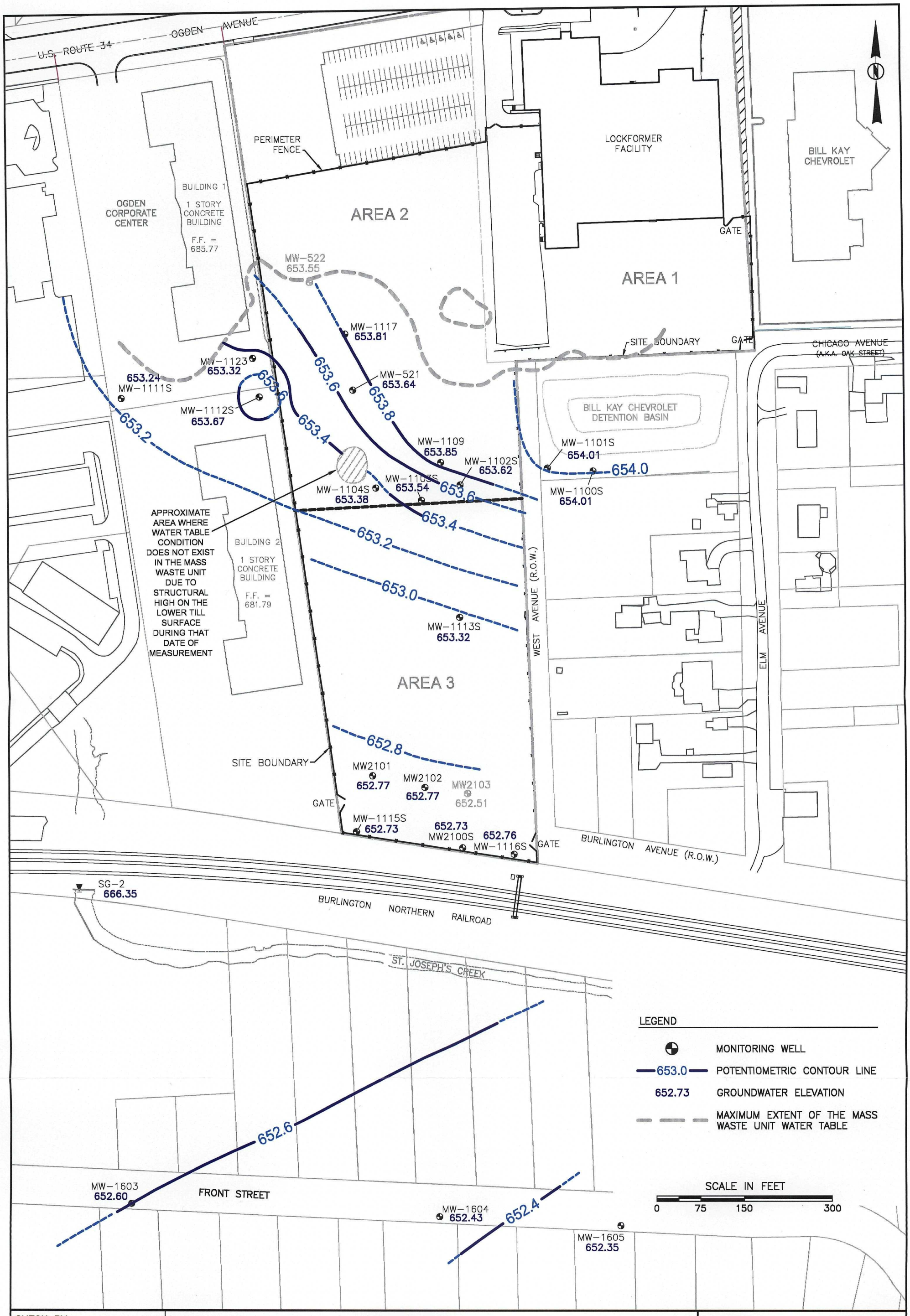

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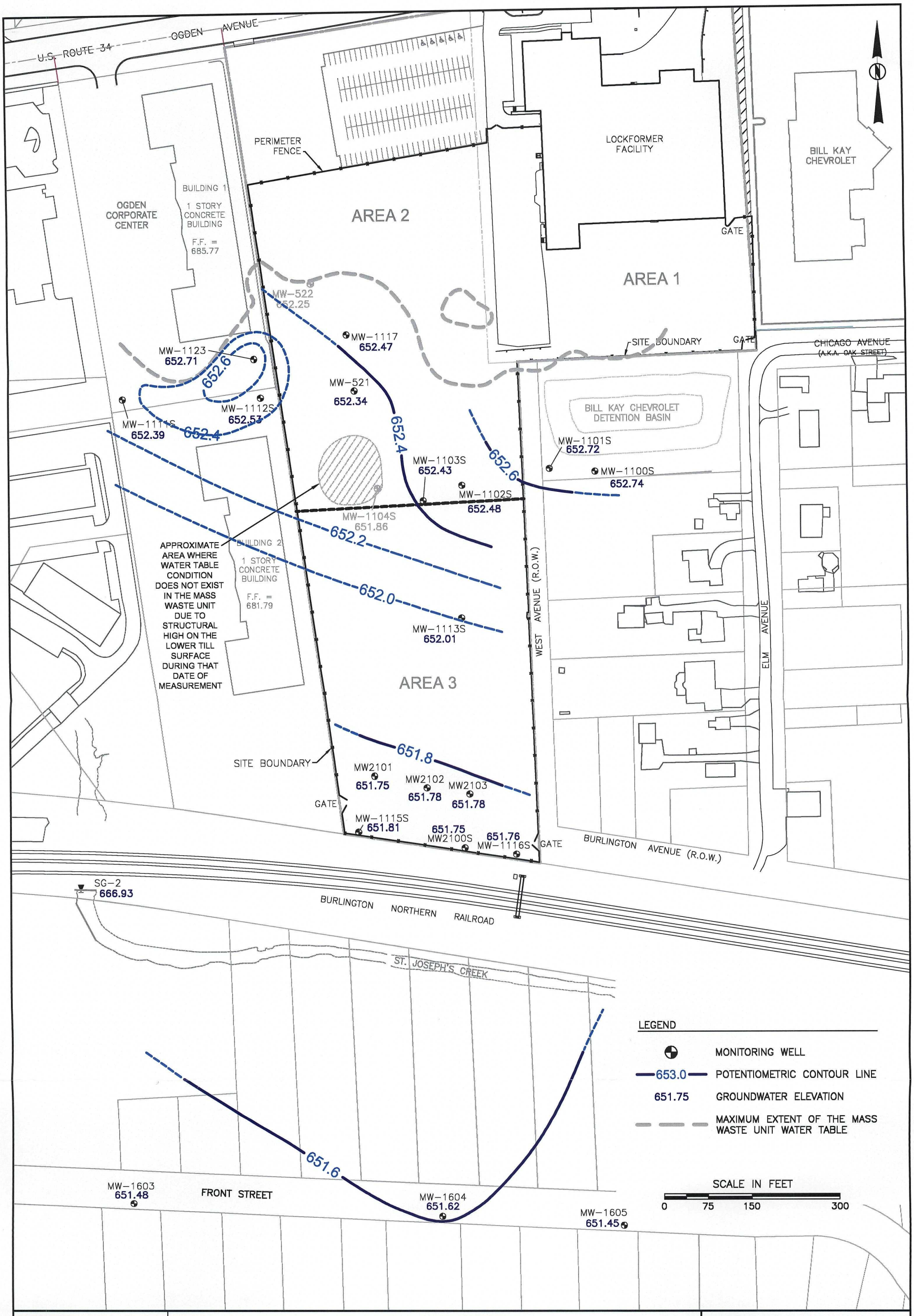
POTENTIOMETRIC SURFACE MAP OF THE
GLACIAL SEDIMENTS
ON NOVEMBER 8, 2002
THE LOCKFORMER COMPANY
711 W. OGDEN AVENUE
LISLE, ILLINOIS

Clayton® GROUP SERVICES

FIGURE 3-1



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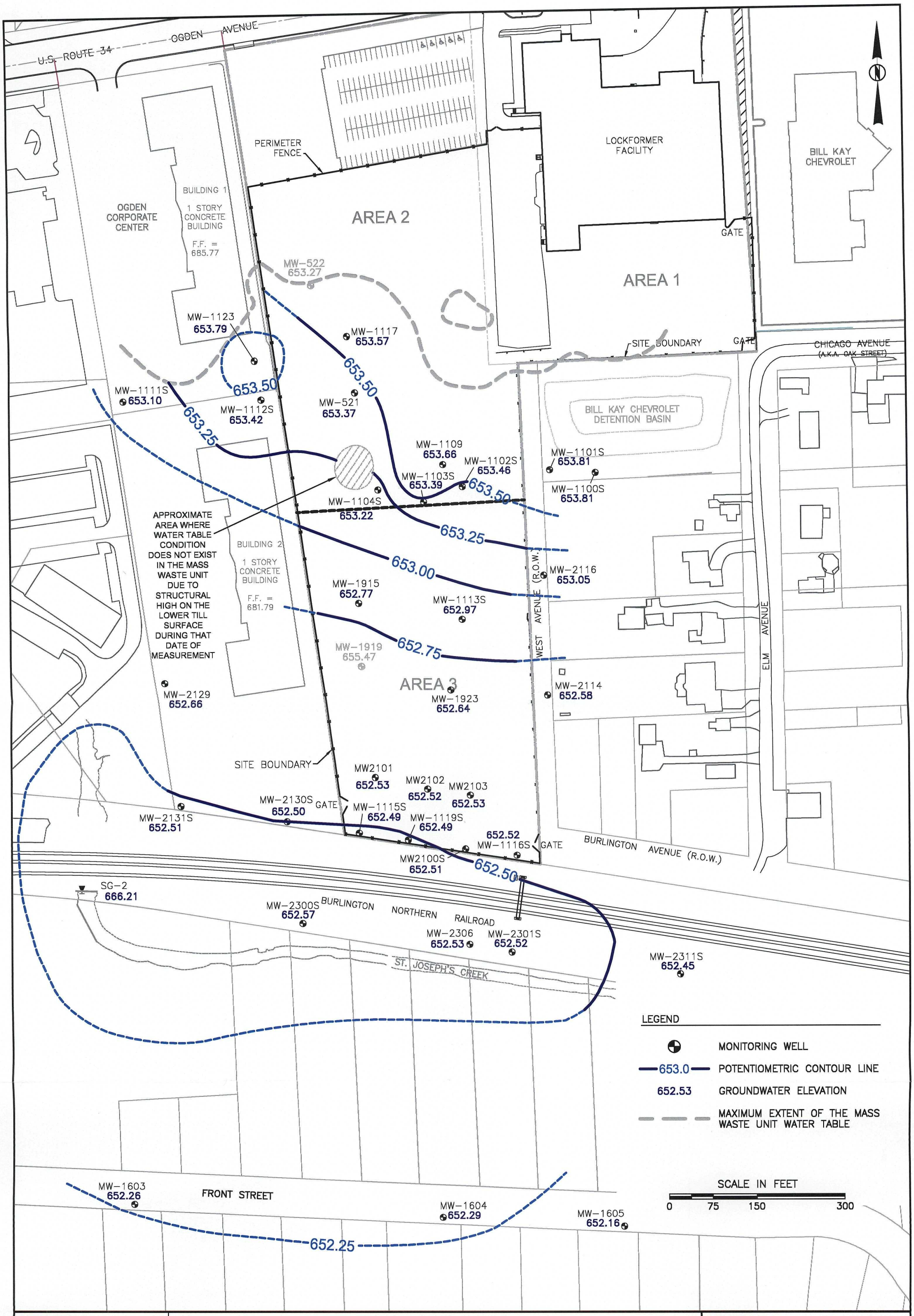
PRJ NO.	65263.60

POTENTIOMETRIC SURFACE MAP OF THE
GLACIAL SEDIMENTS
ON MARCH 28, 2003
THE LOCKFORMER COMPANY
711 W. OGDEN AVENUE
LISLE, ILLINOIS

Clayton GROUP SERVICES

FIGURE 3-2



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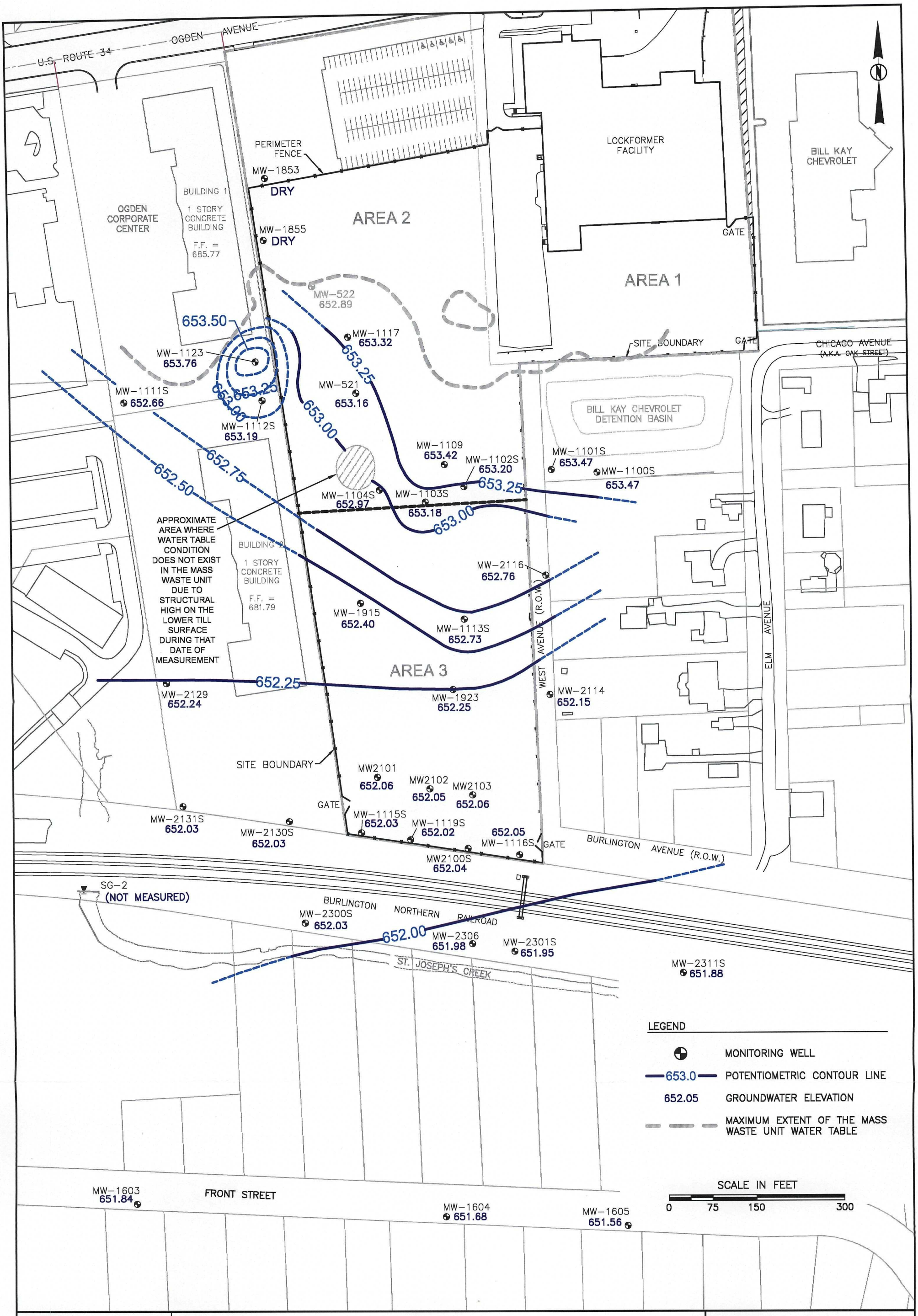
PRJ NO.	65263.60

POTENTIOMETRIC SURFACE MAP OF THE
GLACIAL SEDIMENTS
ON JULY 7, 2003
THE LOCKFORMER COMPANY
711 W. OGDEN AVENUE
LISLE, ILLINOIS

Clayton® GROUP SERVICES

FIGURE 3-3



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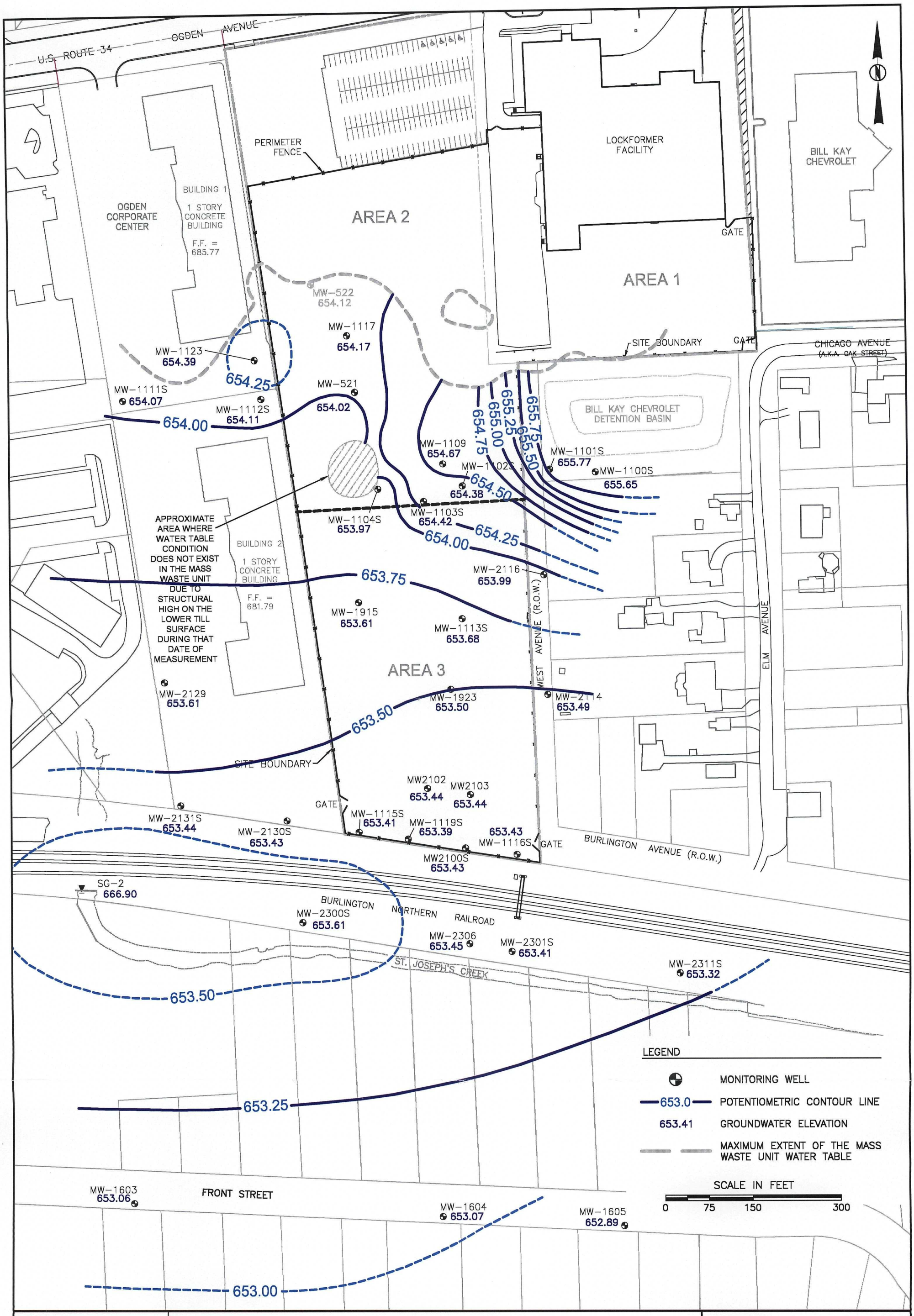
PRJ NO.	65263.60

POTENTIOMETRIC SURFACE MAP OF THE
GLACIAL SEDIMENTS
ON FEBRUARY 4, 2004
THE LOCKFORMER COMPANY
711 W. OGDEN AVENUE
LISLE, ILLINOIS

Clayton GROUP SERVICES

FIGURE 3-4



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SCALE	AS SHOWN
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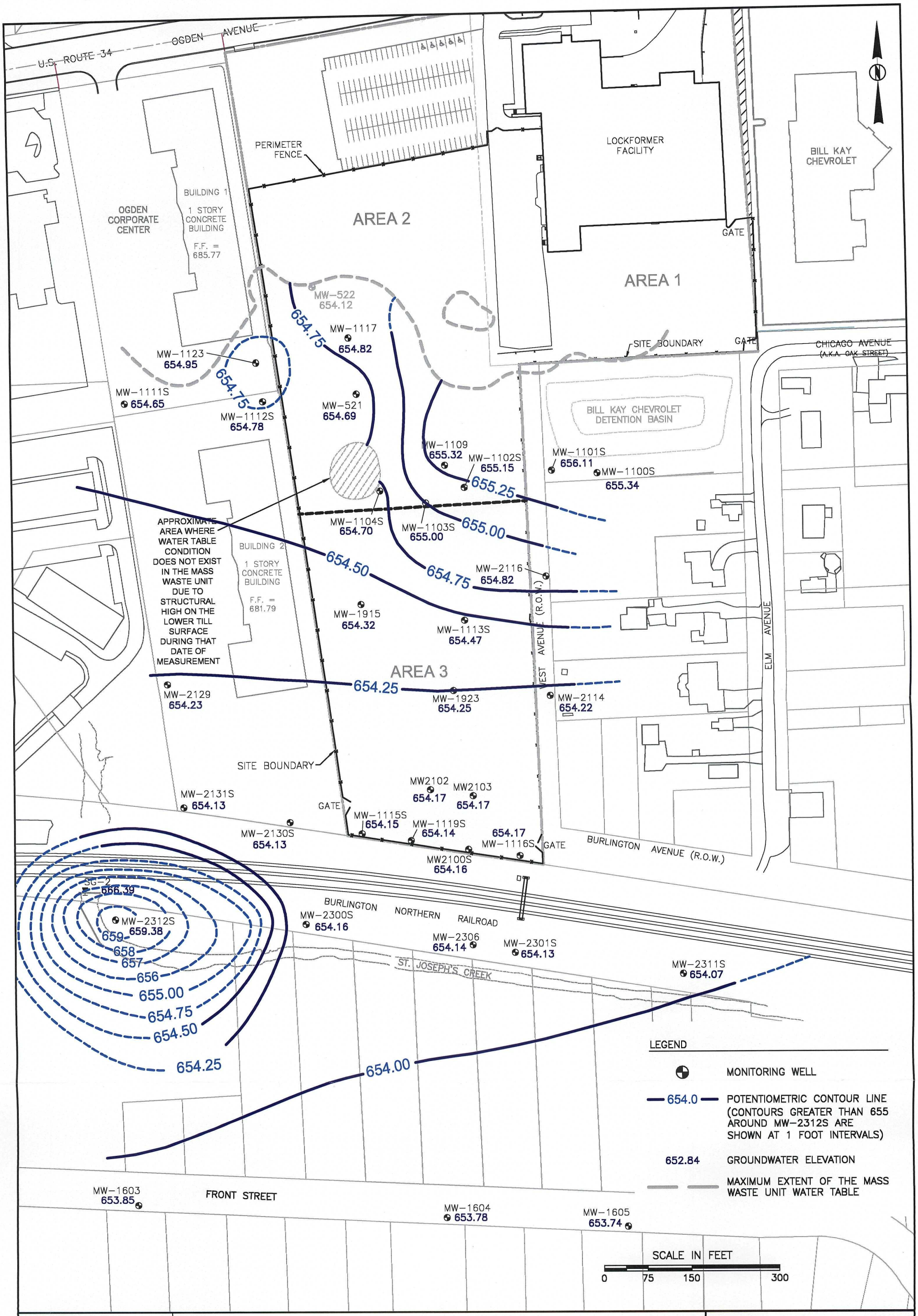
PRJ NO.	65263.70

POTENTIOMETRIC SURFACE MAP OF THE
GLACIAL SEDIMENTS
ON JUNE 1, 2004
THE LOCKFORMER COMPANY
711 W. OGDEN AVENUE
LISLE, ILLINOIS

Clayton® GROUP SERVICES

FIGURE 3-5



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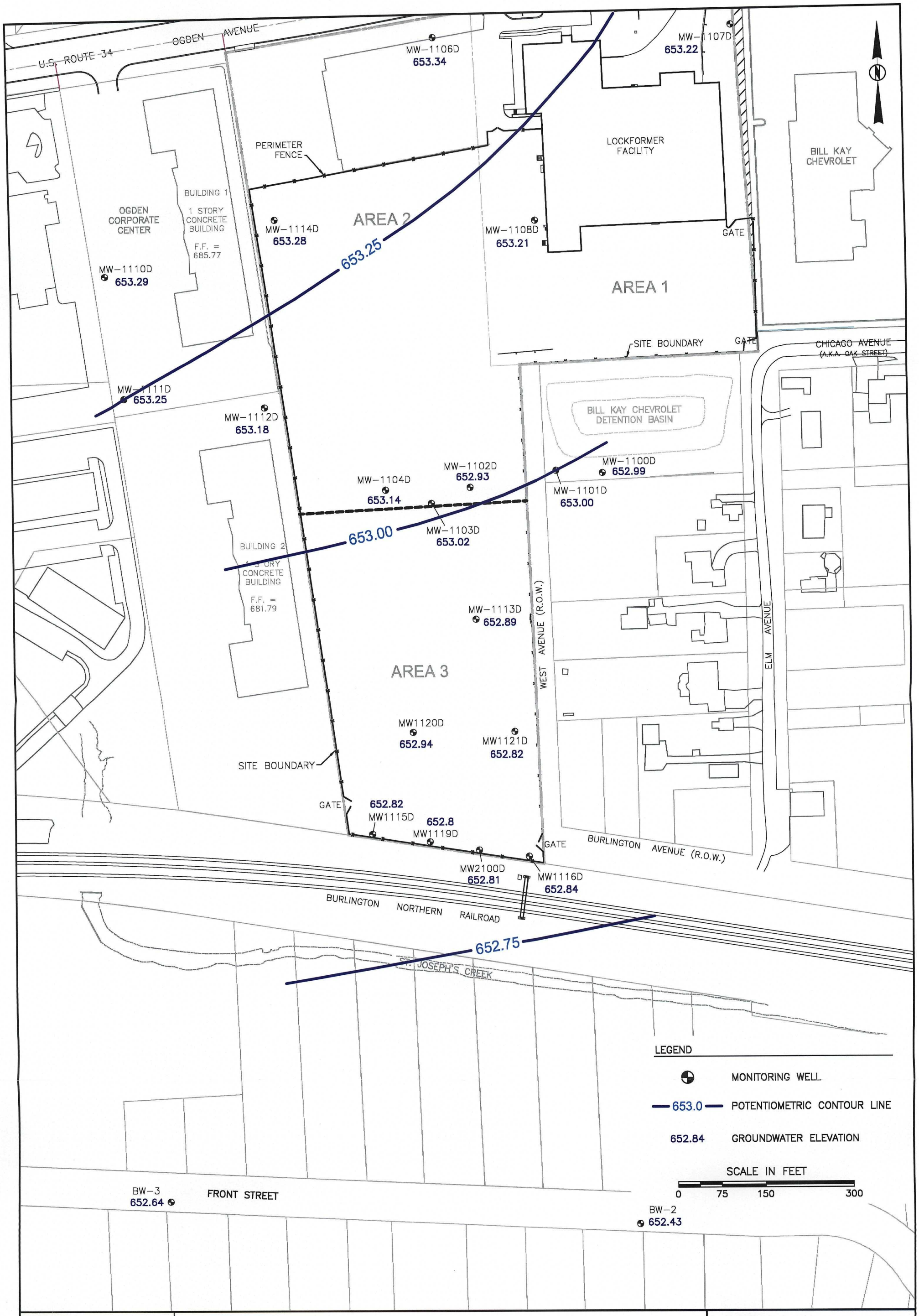
PRJ NO.	65263.70

POTENTIOMETRIC SURFACE MAP OF THE
GLACIAL SEDIMENTS
ON JUNE 21, 2004
THE LOCKFORMER COMPANY
711 W. OGDEN AVENUE
LISLE, ILLINOIS

Clayton® GROUP SERVICES

FIGURE 3-6



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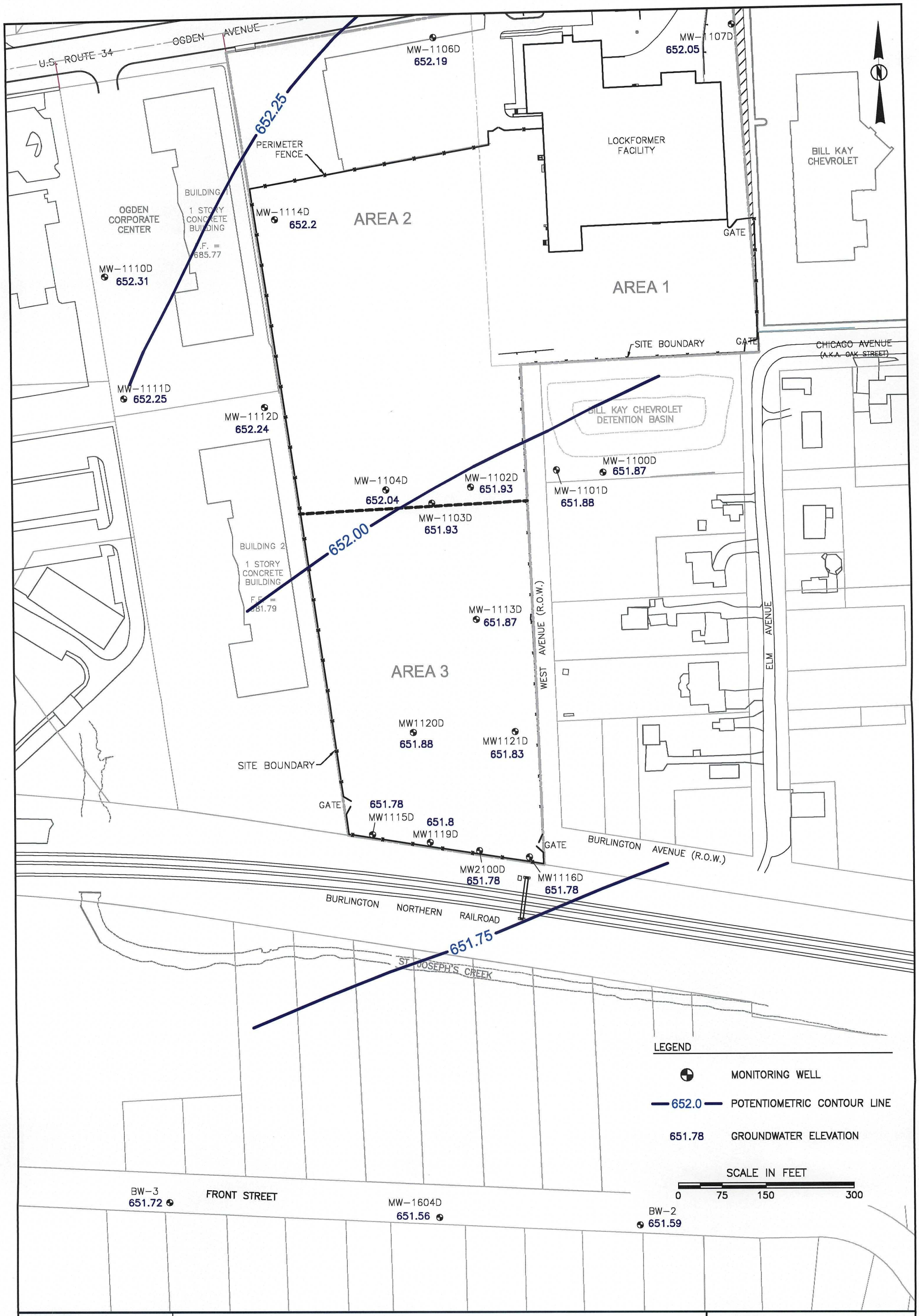
PRJ NO.	65263.70

POTENTIOMETRIC SURFACE MAP OF THE SILURIAN DOLOMITE
IN THE VICINITY OF THE LOCKFORMER SITE
ON NOVEMBER 8, 2002
THE LOCKFORMER COMPANY
711 W. OGDEN AVENUE
LISLE, ILLINOIS

Clayton GROUP SERVICES

FIGURE 3-7



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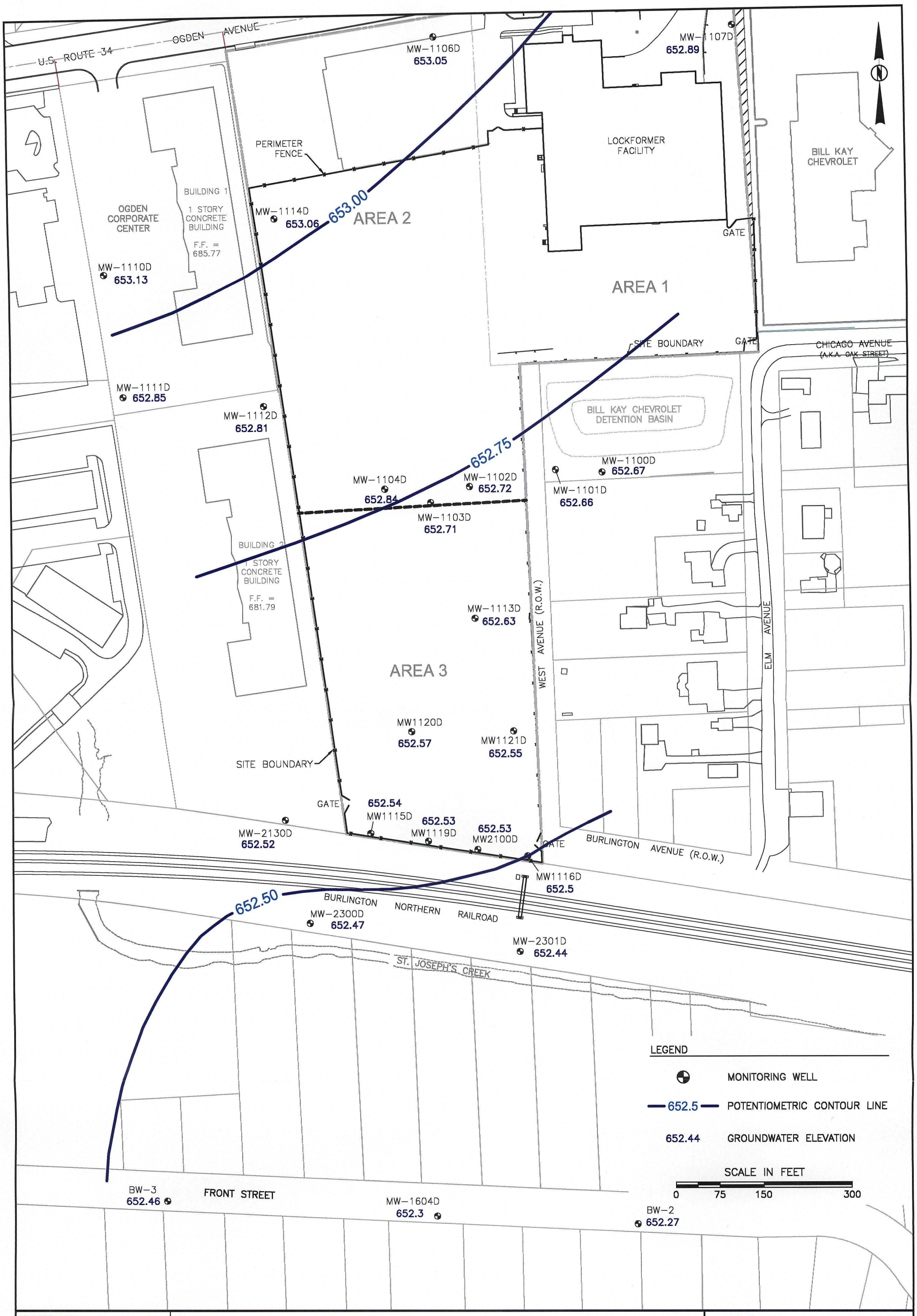
PRJ NO.	65263.70

POTENTIOMETRIC SURFACE MAP OF THE SILURIAN DOLOMITE
IN THE VICINITY OF THE LOCKFORMER SITE
ON MARCH 28, 2003
THE LOCKFORMER COMPANY
711 W. OGDEN AVENUE
LISLE, ILLINOIS

Clayton GROUP SERVICES

FIGURE 3-8



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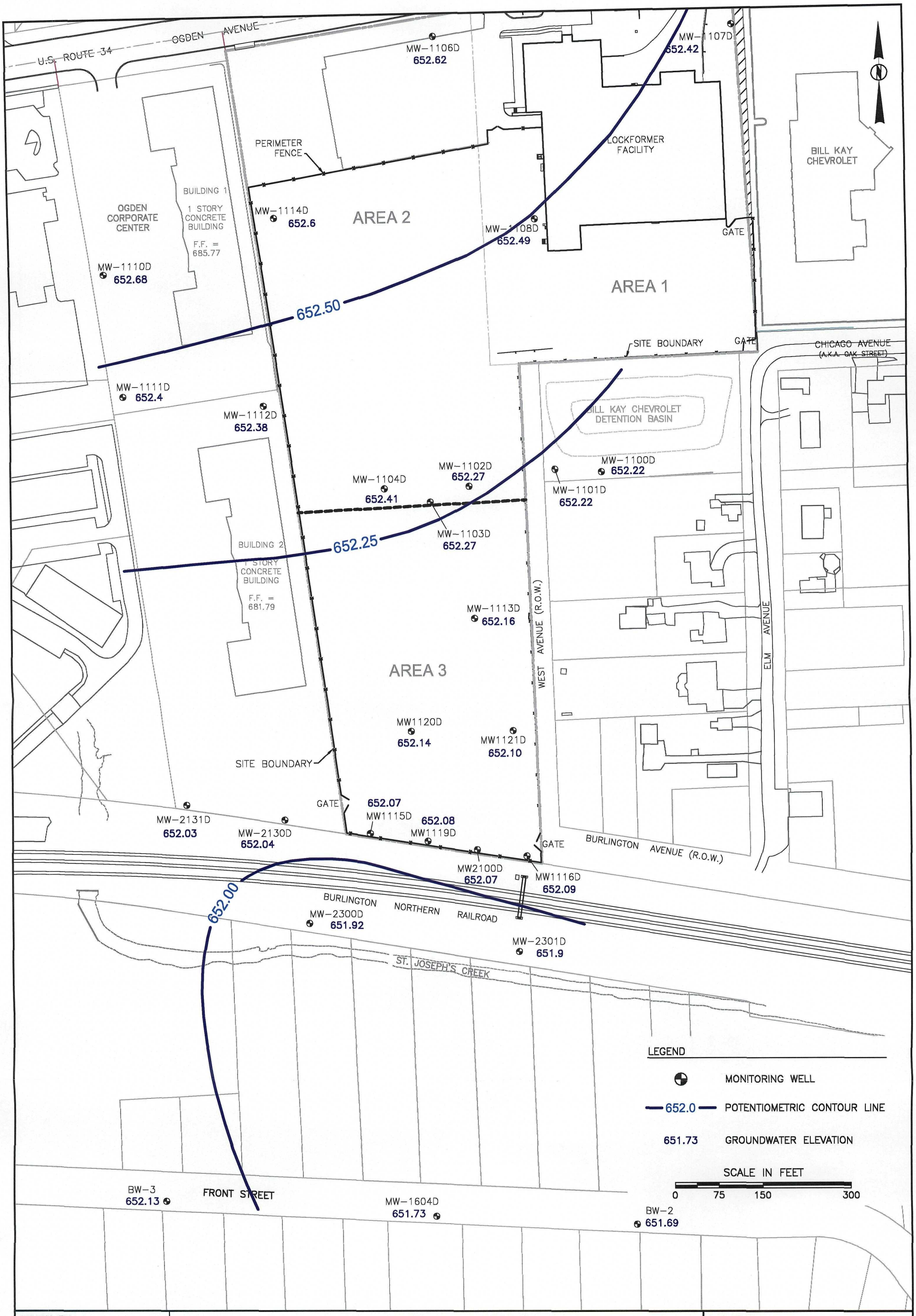
PRJ NO.	65263.70

POTENTIOMETRIC SURFACE MAP OF THE SILURIAN DOLOMITE
IN THE VICINITY OF THE LOCKFORMER SITE
ON JULY 3, 2003
THE LOCKFORMER COMPANY
711 W. OGDEN AVENUE
LISLE, ILLINOIS

Clayton GROUP SERVICES

FIGURE 3-9



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PRJ NO.	65263.70

POTENTIOMETRIC SURFACE MAP OF THE SILURIAN DOLOMITE
IN THE VICINITY OF THE LOCKFORMER SITE
ON FEBRUARY 5, 2004
THE LOCKFORMER COMPANY
711 W. OGDEN AVENUE
LISLE, ILLINOIS

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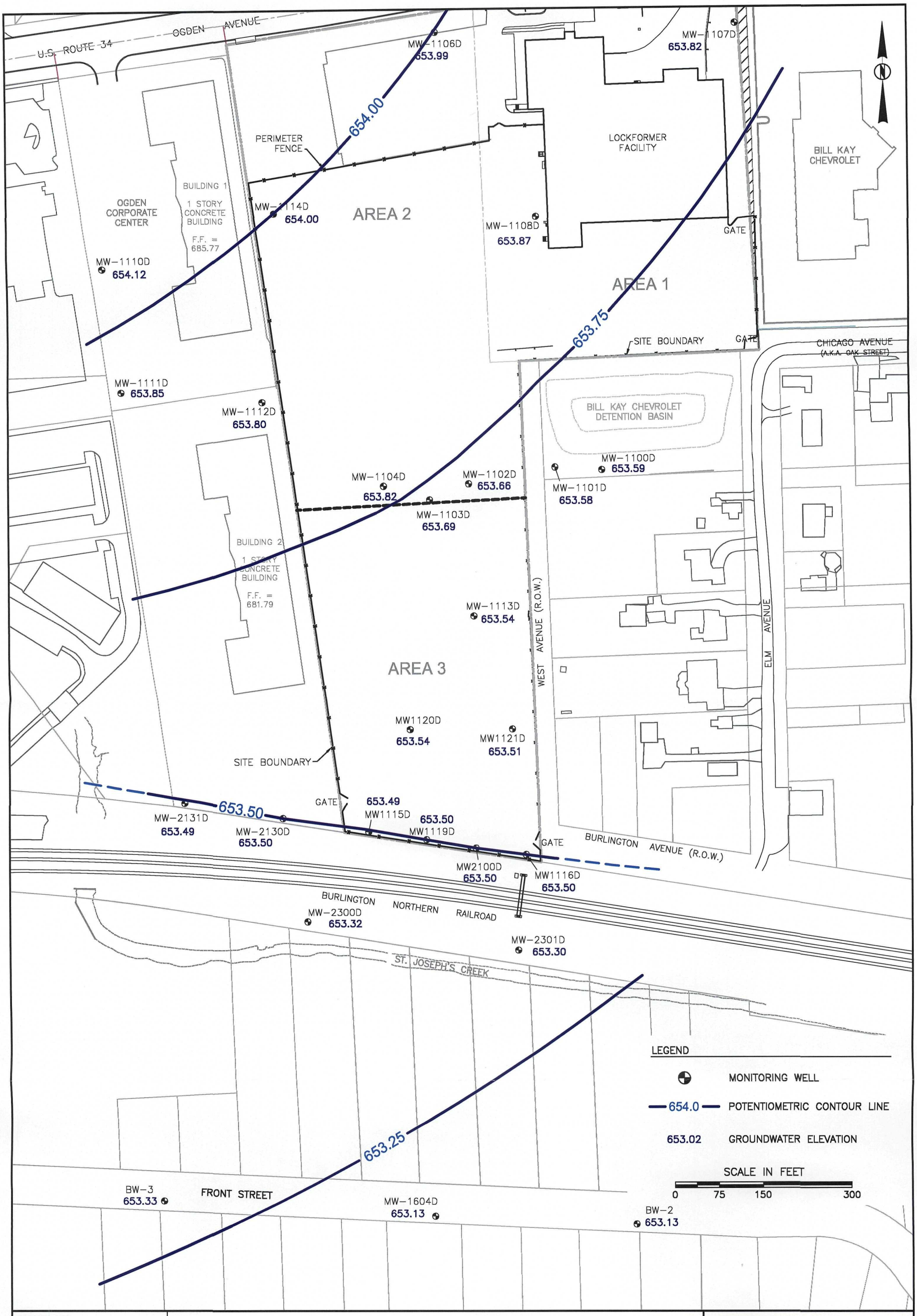
FIGURE 3-10



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PRJ NO.	65263.70

POTENTIOMETRIC SURFACE MAP OF THE SILURIAN DOLOMITE
IN THE VICINITY OF THE LOCKFORMER SITE
ON JUNE 1, 2004
THE LOCKFORMER COMPANY
711 W. OGDEN AVENUE
LISLE, ILLINOIS

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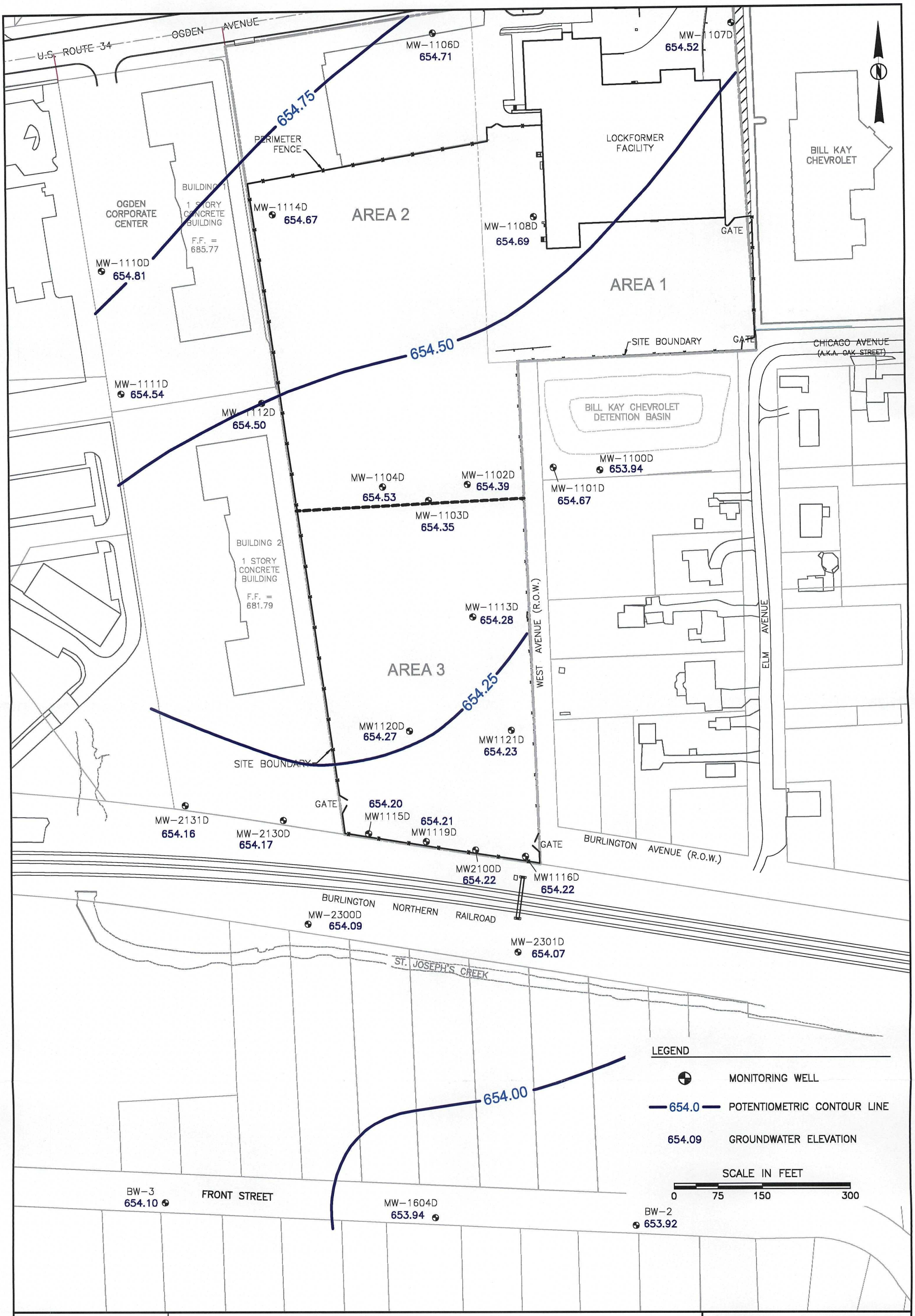
FIGURE 3-11



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POTENTIOMETRIC SURFACE MAP OF THE SILURIAN DOLOMITE
IN THE VICINITY OF THE LOCKFORMER SITE
ON JUNE 21, 2004
THE LOCKFORMER COMPANY
711 W. OGDEN AVENUE
LISLE, ILLINOIS

Clayton GROUP SERVICES

FIGURE 3-12

TABLES

TABLE 2-1
Geotechnical Lithologic Analysis

The Lockformer Company / Lisle, Illinois

COMPOUNDS	SAMPLE LOCATION							
	CSB-1000	CSB-1001		CSB-1002		CSB-1203		
	48-50 ft	36-38 ft	42-44 ft	42-48 ft	54-56 ft	43 ft	46 ft	53 ft
Non-Carbonate Organic Carbon (%)	3.78	5.83	0.66	2.29	0.663	0.1805	0.9225	0.669
Grain Size (USCS)	NA	NA	NA	NA	NA	Sandy Gravel, Little Silt, **GP-GM**	Silty Clay, Trace Sand, Trace Gravel, **CL**	Silty Clay, Trace Sand, **CL**
Lithologic Unit	Lower Sand	Mass Waste	Lower Till	Lower Till	Lower Sand	Lower Sand	Lower Till	Lower Till
Moisture Content (%)	NA	NA	NA	NA	NA	NA	18.3	17.9
Specific Gravity	NA	NA	NA	NA	NA	2.70	2.75	2.75
Bulk Density (pounds/ft^3) (dry)	NA	NA	NA	NA	NA	NA	111.8	112.7
Total Porosity (%)	NA	NA	NA	NA	NA	NA	0.35	0.34
Air-filled Porosity (%)	NA	NA	NA	NA	NA	NA	0.02	0.02
Water-filled Porosity (%)	NA	NA	NA	NA	NA	NA	0.33	0.32
Total Organic Matter (%)	NA	NA	NA	NA	NA	NA	NA	NA

NOTES: NA = Not Analyzed

TABLE 2-1
Geotechnical Lithologic Analysis

The Lockformer Company / Lisle, Illinois

COMPOUNDS	SAMPLE LOCATION							
	CSB-1204							
	5 ft	25 ft	33 ft	46 ft	50 ft	54 ft	56 ft	70 ft
Non-Carbonate Organic Carbon (%)	0.7725	0.8055	0.376	0.283	0.872	0.8825	0.243	0.0979
Grain Size (USCS)	Silty Clay, Some Sand, Trace Gravel, **CL**	Silty Clay, Little Sand, Trace Gravel, **CL**	Sand, Some Gravel, Little Silt, **SW-SM**	Sandy Gravel, Trace Silt, Trace Clay, **GW-GM**	Silty Clay, Trace Sand, Trace Gravel, **CL**	Silty Clay, Trace Sand, **CL**	Silty Clay, Some Sand, Trace Gravel, **CL**	Silty Clay, Some Sand, Trace Gravel, **CL**
Lithologic Unit	Upper Till/Fill	Upper Till/Fill	Mass Waste	Mass Waste	Lower Till	Lower Till	Lower Sand	Lower Sand
Moisture Content (%)	27.8	21.4	NA	NA	21.7	22.8	11.4	15.3
Specific Gravity	2.75	2.75	2.70	2.70	2.75	2.75	2.79	2.79
Bulk Density (pounds/ft^3) (dry)	95	106.1	NA	NA	106.0	103	129.1	119.2
Total Porosity (%)	0.45	0.38	NA	NA	0.38	0.40	0.26	0.31
Air-filled Porosity (%)	0.02	0.02	NA	NA	0.01	0.02	0.02	0.02
Water-filled Porosity (%)	0.42	0.36	NA	NA	0.37	0.38	0.24	0.29
Total Organic Matter (%)	NA	NA	NA	NA	NA	NA	NA	NA

NOTES: NA = Not Analyzed

TABLE 2-1
Geotechnical Lithologic Analysis

The Lockformer Company / Lisle, Illinois

COMPOUNDS	SAMPLE LOCATION							
	CSB-1205							
	5 ft	26 ft	32 ft	45 ft	49 ft	54 ft	60 ft	73 ft
Non-Carbonate Organic Carbon (%)	0.544	0.812	0.268	0.2635	0.5115	0.8635	0.1835	0.0772
Grain Size (USCS)	Silty Clay, Some Sand, Trace Gravel, **CL**	Silty Clay, Little Sand, Trace Gravel, **CL**	Sand, Some Gravel, Little Silt, **SP-SM**	Gravelly Sand, Little Silt, **SW-SM**	Silty Clay, Some Sand, **CL**	Silty Clay, Trace Sand, **CL**	Silty Clay, Some Sand, Little Gravel, **CL**	Sand, Little Silt, **SP-SM**
Lithologic Unit	Upper Till/Fill	Upper Till/Fill	Mass Waste	Mass Waste	Lower Till	Lower Till	Lower Sand	Lower Sand
Moisture Content (%)	22.0	22.6	NA	NA	14.3	20.8	8.6	NA
Specific Gravity	2.79	2.75	2.70	2.70	2.79	2.75	2.79	2.70
Bulk Density (pounds/ft^3) (dry)	102.6	103.6	121.7	NA	121.7	106.3	137.7	NA
Total Porosity (%)	0.41	0.40	NA	NA	0.30	0.38	0.21	NA
Air-filled Porosity (%)	0.05	0.02	NA	NA	0.02	0.03	0.02	NA
Water-filled Porosity (%)	0.36	0.38	NA	NA	0.28	0.35	0.19	NA
Total Organic Matter (%)	NA	NA	NA	NA	NA	NA	NA	NA

NOTES: NA = Not Analyzed

TABLE 2-1
Geotechnical Lithologic Analysis

The Lockformer Company / Lisle, Illinois

COMPOUNDS	SAMPLE LOCATION								
	CSB-1206								
	3 ft	33 ft	36 ft	47 ft	49 ft	53 ft	56 ft	59 ft	75 ft
Non-Carbonate Organic Carbon (%)	0.5505	0.8435	0.2545	0.212	0.6325	0.825	0.688	0.172	0.0854
Grain Size (USCS)	Silty Clay, Little Sand, Trace Gravel, **CL**	Silty Clay, Little Sand, Trace Gravel, **CL**	Gravelly Sand, Little Silt, **SW-SM**	Sand, Trace Gravel, Some Silt, **SM**	Silty Clay, Trace Sand, **CL**	Silty Clay, Trace Sand, **CL**	Silty Clay, Trace Sand, **CL**	Silty Clay, Some Sand, Trace Gravel, **CL**	Clayey Sand, Trace Gravel, **SC**
Lithologic Unit	Upper Till/Fill	Upper Till/Fill	Mass Waste	Mass Waste	Lower Till	Lower Till	Lower Sand	Lower Sand	Lower Sand
Moisture Content (%)	20.0	22.5	NA	NA	18.1	19.1	22.9	10.5	16.1
Specific Gravity	2.75	2.75	2.70	2.70	2.75	2.75	2.75	2.79	2.78
Bulk Density (pounds/ft^3) (dry)	108.1	103.9	NA	NA	112.5	110.5	103.6	131.9	109.1
Total Porosity (%)	0.37	0.39	NA	NA	0.34	0.36	0.40	0.24	0.37
Air-filled Porosity (%)	0.02	0.02	NA	NA	0.02	0.02	0.02	0.02	0.09
Water-filled Porosity (%)	0.35	0.37	NA	NA	0.33	0.34	0.38	0.22	0.28
Total Organic Matter (%)	NA	NA	NA	NA	NA	NA	NA	NA	NA

NOTES: NA = Not Analyzed

TABLE 2-1
Geotechnical Lithologic Analysis

The Lockformer Company / Lisle, Illinois

COMPOUNDS	SAMPLE LOCATION							
	CSB-1207							
	3 ft	33 ft	36 ft	47 ft	51 ft	64 ft	67 ft	75 ft
Non-Carbonate Organic Carbon (%)	0.472	0.827	0.143	0.27	0.84	0.22	0.06	0.10
Grain Size (USCS)	Silty Clay, Some Sand, Trace Gravel, **CL**	Silty Clay, Little Sand, Trace Gravel, **CL**	Gravel, Some Sand, Little Silt, **GW-GM**	Sand, Little Gravel, Some Silt, **SM**	Silty Clay, Trace Sand, **CL**	Silty Clay, Some Sand, Trace Gravel, **CL**	Silty Sand, Trace Clay, **SM**	Clayey Sand, **SM**
Lithologic Unit	Upper Till/Fill	Upper Till/Fill	Mass Waste	Mass Waste	Lower Till	Lower Till	Lower Sand	Lower Sand
Moisture Content (%)	18.3	17.3	NA	NA	19.0	15.0	15.3	17.1
Specific Gravity	2.79	2.79	2.70	2.70	2.75	2.79	2.78	2.78
Bulk Density (pounds/ft^3) (dry)	112.7	114.9	NA	NA	110	119.9	116.4	110.3
Total Porosity (%)	0.35	0.34	NA	NA	0.36	0.31	0.33	0.36
Air-filled Porosity (%)	0.02	0.02	NA	NA	0.02	0.02	0.04	0.06
Water-filled Porosity (%)	0.33	0.32	NA	NA	0.33	0.29	0.29	0.30
Total Organic Matter (%)	NA	NA	NA	NA	NA	NA	NA	NA

NOTES: NA = Not Analyzed

TABLE 2-1
Geotechnical Lithologic Analysis

The Lockformer Company / Lisle, Illinois

COMPOUNDS	SAMPLE LOCATION							
	CSB-1208							
	5 ft	28 ft	32 ft	44 ft	47 ft	52 ft	57 ft	71 ft
Non-Carbonate Organic Carbon (%)	0.89	0.82	0.35	0.27	0.57	0.89	0.17	0.21
Grain Size (USCS)	Silty Clay, Little Sand, Trace Gravel, **CL**	Silty Clay, Little Sand, Trace Gravel, **CL**	Sandy Gravel, Little Silt, **GW-GM**	Sand, Some Gravel, Trace Silt, **SP**	Silty Clay, Some Sand, Some Gravel, **CL**	Silty Clay, Trace Sand, **CL**	Clayey Sand, Some Gravel, **SC**	Silty Clay, Little Sand, Trace Gravel, **CL**
Lithologic Unit	Upper Till/Fill	Upper Till/Fill	Mass Waste	Mass Waste	Lower Till	Lower Till	Lower Sand	Lower Sand
Moisture Content (%)	24.5	18.9	NA	NA	17.9	22.4	10.9	13.4
Specific Gravity	2.75	2.75	2.70	2.70	2.78	2.75	2.78	2.79
Bulk Density (pounds/ft^3) (dry)	99.7	110.3	NA	NA	111.1	103.8	130.6	123.8
Total Porosity (%)	0.42	0.36	NA	NA	0.36	0.40	0.25	0.29
Air-filled Porosity (%)	0.03	0.02	NA	NA	0.04	0.02	0.02	0.02
Water-filled Porosity (%)	0.39	0.33	NA	NA	0.32	0.37	0.23	0.27
Total Organic Matter (%)	NA	NA	NA	NA	NA	NA	NA	NA

NOTES: NA = Not Analyzed

TABLE 2-1
Geotechnical Lithologic Analysis

The Lockformer Company / Lisle, Illinois

COMPOUNDS	SAMPLE LOCATION							
	CSB-1209							
	3 ft	29 ft	33 ft	44 ft	46 ft	52 ft	57 ft	70 ft
Non-Carbonate Organic Carbon (%)	0.28	0.81	0.32	0.32	0.86	0.84	0.23	0.08
Grain Size (USCS)	Silty Clay, Little Sand, Little Gravel, **CL**	Silty Clay, Little Sand, Trace Gravel, **CL**	Sand, Some Gravel, Little Silt, **SP-SM**	Gravelly Sand, Little Silt, **SW-SM**	Silty Clay, Trace Sand, **CL**	Silty Clay, Trace Sand, **CL**	Silty Clay, Some Sand, Little Gravel, **CL**	Silt and Sand, **ML**
Lithologic Unit	Upper Till/Fill	Upper Till/Fill	Mass Waste	Mass Waste	Lower Till	Lower Till	Lower Sand	Lower Sand
Moisture Content (%)	19.7	21.8	NA	NA	21.0	21.9	13.9	17.5
Specific Gravity	2.79	2.75	2.70	2.70	2.75	2.75	2.79	2.79
Bulk Density (pounds/ft^3) (dry)	106.7	105.4	NA	NA	106.6	104.8	122.6	108.9
Total Porosity (%)	0.39	0.39	NA	NA	0.38	0.39	0.30	0.37
Air-filled Porosity (%)	0.05	0.02	NA	NA	0.02	0.02	0.02	0.07
Water-filled Porosity (%)	0.34	0.37	NA	NA	0.36	0.37	0.27	0.31
Total Organic Matter (%)	NA	NA	NA	NA	NA	NA	NA	NA

NOTES: NA = Not Analyzed

TABLE 2-1
Geotechnical Lithologic Analysis

The Lockformer Company / Lisle, Illinois

COMPOUNDS	SAMPLE LOCATION							
	CSB-1210							
	3 ft	28 ft	31 ft	45 ft	46 ft	54 ft	57 ft	69 ft
Non-Carbonate Organic Carbon (%)	0.48	0.83	0.24	0.31	0.85	0.91	0.45	0.09
Grain Size (USCS)	Silty Clay, Little Sand, Trace Gravel, **CL**	Silty Clay, Some Sand, Trace Gravel, **CL**	Sand, Some Gravel, Some Silt, **SM**	Sand, Some Gravel, Little Silt, **SP-SM**	Silty Clay, Trace Sand, Trace Gravel, **CL**	Silty Clay, Trace Sand, **CL**	Silty Clay, Some Sand, Little Gravel, **CL**	Sand, Some Silt, **SC**
Lithologic Unit	Upper Till/Fill	Upper Till/Fill	Mass Waste	Mass Waste	Lower Till	Lower Till	Lower Sand	Lower Sand
Moisture Content (%)	18.3	16.5	NA	NA	20.7	20.5	12.0	NA
Specific Gravity	2.79	2.79	2.70	2.70	2.75	2.75	2.79	2.70
Bulk Density (pounds/ft^3) (dry)	112.3	117.1	NA	NA	107	107.4	127.7	NA
Total Porosity (%)	0.35	0.33	NA	NA	0.38	0.37	0.27	NA
Air-filled Porosity (%)	0.03	0.02	NA	NA	0.02	0.02	0.02	NA
Water-filled Porosity (%)	0.33	0.31	NA	NA	0.36	0.35	0.25	NA
Total Organic Matter (%)	NA	NA	NA	NA	NA	NA	NA	NA

NOTES: NA = Not Analyzed

TABLE 2-1
Geotechnical Lithologic Analysis

The Lockformer Company / Lisle, Illinois

COMPOUNDS	SAMPLE LOCATION							
	MW-1108S							
	4 ft	32 ft	35 ft	45 ft	49 ft	55 ft	60 ft	75 ft
Non-Carbonate Organic Carbon (%)	0.57	0.82	0.10	0.33	0.74	0.93	0.23	0.13
Grain Size (USCS)	Silty Clay, Little Sand, Trace Gravel, **CL**	Silty Clay, Some Sand, Trace Gravel, **CL**	Sand, Little Gravel, Some Silt, **SM**	Sandy Gravel, Little Silt, **GP-GM**	Silty Clay, Trace Sand, **CL**	Silty Clay, Trace Sand, **CL**	Silty Clay, Some Sand, Some Gravel, **CL**	Sand, Trace Silt, **SP**
Lithologic Unit	Upper Till/Fill	Upper Till/Fill	Mass Waste	Mass Waste	Lower Till	Lower Till	Lower Till	Lower Sand
Moisture Content (%)	22.7	17.0	NA	NA	19.3	18.9	12.5	NA
Specific Gravity	2.75	2.79	2.70	2.70	2.75	2.75	2.78	2.70
Bulk Density (pounds/ft^3) (dry)	103.4	115.2	NA	NA	110	109.5	126.4	NA
Total Porosity (%)	0.40	0.34	NA	NA	0.36	0.36	0.27	NA
Air-filled Porosity (%)	0.02	0.02	NA	NA	0.02	0.03	0.02	NA
Water-filled Porosity (%)	0.38	0.31	NA	NA	0.34	0.33	0.25	NA
Total Organic Matter (%)	NA	NA	NA	NA	NA	NA	NA	NA

NOTES: NA = Not Analyzed

TABLE 2-1
Geotechnical Lithologic Analysis

The Lockformer Company / Lisle, Illinois

COMPOUNDS	SAMPLE LOCATION							
	CSB1853			CSB1854	CSB1122A			MW1122S
	38.5	48	52	45.5	43.5	44	46-48	41-43
Non-Carbonate Organic Carbon (%)	NA	NA	NA	NA	NA	NA	NA	NA
Grain Size (USCS)	Silty Clay, Trace Sand, **CL**	Silt, Some Sand, Trace Gravel, **ML**	Silt, Some Sand, Trace Gravel, **ML**	Silt, Some Sand, Trace Gravel, **ML**	Silt, Some Sand, **ML**	NA	Silt, Some Sand, Little Gravel, **ML**	Clayey Silt, Trace Sand, Trace Gravel, **CL-ML**
Lithologic Unit	Lower Till	Lower Till	Lower Till	Lower Till	Lower Till	Lower Till	Lower Till	Lower Till
Moisture Content (%)	NA	NA	NA	NA	NA	NA	11.9	18.7
Specific Gravity	NA	NA	NA	NA	NA	NA	NA	NA
Bulk Density (pounds/ft^3) (dry)	NA	NA	NA	NA	NA	NA	139.3	128.5
Total Porosity (%)	NA	NA	NA	NA	NA	NA	NA	NA
Air-filled Porosity (%)	NA	NA	NA	NA	NA	NA	NA	NA
Water-filled Porosity (%)	NA	NA	NA	NA	NA	NA	NA	NA
Total Organic Matter (%)	NA	0.4	NA	0.4	NA	0.4	0.6	0.3

NOTES: NA = Not Analyzed

TABLE 2-2
Summary of Average Geotechnical Results by Lithologic Unit

The Lockformer Company / Lisle, Illinois

LITHOLOGIC UNIT	FRACTION OF ORGANIC CARBON (foc) (%)	MOISTURE CONTENT (Ow) (%)	BULK DENSITY (Pb) (lb/ft^3)	TOTAL POROSITY (%)	AIR-FILLED POROSITY (%)	WATER-FILLED POROSITY (%)
Fill / Till (1)	0.694	20.71	107.31	0.38	0.03	0.35
Mass Waste (2)	0.2635	ND	ND	ND	ND	ND
Lower Till (3)	0.74 / 0.42 [(a)]	18.7	112.8	0.36	0.02	0.34
Lower Sand (4)	0.192	14.22	120.84	0.30	0.03	0.27

NOTES:

ND = Not Determined

a = first value is the average from the former TCE fill pipe area/second value is the average from west side of Area 2 (excluding 1000-series borings)

TABLE 3-1
Static Water Levels

The Lockformer Company / Lisle, Illinois

Monitoring Well ID	GW Elev. Aug-98 (msl)	GW Elev. Feb-99 (msl)	GW Elev. Mar-99 (msl)	GW Elev. Dec-99 (msl)	GW Elev. Nov-00 (msl)	GW Elev. 12/19/2001 (msl)	GW Elev. 1/11/2001 (msl)	GW Elev. 3/21/2001 (msl)	GW Elev. 5/15/2001 (msl)	GW Elev. 6/27/2001 (msl)	GW Elev. 7/12/2001 (msl)	GW Elev. 8/10/2001 (msl)	GW Elev. 9/10/2001 (msl)	GW Elev. 9/20/2001 (msl)
BW-1						652.21	656.76	653.70	653.80	653.27	652.76	652.66	652.73	652.64
BW-2						652.76	652.51	654.06	654.25	653.64	653.25	653.10	653.14	653.15
BW-3						652.90	652.66	654.22	654.40	653.74	653.37	653.22	653.29	653.31
P-1						709.58	709.77	709.93						
P-2						668.37	668.16	668.05						
P-3						652.75	652.53	654.06						
MW-101	699.40	702.44	701.63		698.64	697.93	699.49	700.87	699.37	698.57		698.51		698.67
MW-104														
MW-105														
MW-120	675.04	675.19	674.86	674.74	668.50	668.30	668.18	669.32	668.43	660.08		666.12		666.05
MW-123	700.27	702.47	702.48	699.81	700.27	699.90	700.30	701.57	701.10	700.19		700.17		700.56
MW-126	655.80	655.00	654.91	652.92	653.60	653.73	655.26	655.18	654.72	654.08		653.53		653.50
MW-401	657.43	656.73	656.80	655.96	655.73	655.61	655.46	655.83	656.42	656.56		656.31		655.99
MW-402	655.56	657.71	655.81	654.20	654.86	654.17	653.79	655.20	655.94	655.31		654.79		654.93
MW-403	656.15	655.95	655.74	653.47										
MW-500S														
MW-500D		656.26	655.72	655.80	654.49	655.36	654.54	659.85	655.76	655.23		654.63		654.39
MW-501S				695.53	695.98	689.49	692.83							
MW-501D		656.84	656.79	655.23	655.42	655.19	655.01	656.03	656.47	656.41		655.96		655.58
MW-502S	699.40	701.28	701.93	703.73	707.06	707.25	706.66	706.86	707.89	704.09		705.79		707.22
MW-503S				693.39										
MW-504S														
MW-504D		656.11	657.39	653.87	654.81	655.42	658.64	656.48	655.93	655.45		654.88		654.69
MW-505S														
MW-506S														
MW-507S														
MW-508S														
MW-508D		658.30	656.54	653.90	655.00	654.79	654.48	655.47	655.88	655.62		655.04		654.74
MW-513D		656.15	655.76	653.49	654.67	654.01	655.52	655.54	655.73	655.11		654.55		654.71
MW-514D		657.29	655.78	653.71	654.95	654.14	653.76	655.80	655.93	655.27		654.79		655.18
MW-515D		656.57	655.94	653.52	654.81	654.53	657.00	659.62	655.87	655.24		654.70		654.78
MW-516D		656.59	655.94	653.61	654.75	654.07	658.68	658.67	655.87	655.24		654.65		654.88
MW-517D		656.36	655.77	653.67	654.51	653.97	656.53	659.85	655.75	655.18		654.62		654.41
MW-518D				653.46										
MW-519D				653.81										
MW-520					654.05	653.67	653.43	655.22						
MW-521					656.15	653.79	656.00	655.86	655.38	654.91		654.31		654.11
MW-522					654.26	653.76	653.51	655.51	655.81	655.35		654.26		654.18
MW-1100S									656.11	655.39		654.98		655.60
MW-1100D									654.74	654.08	653.66	653.54	653.56	653.54
MW-1101S									656.11	655.39		654.95		655.62
MW-1101D									654.73	654.06	653.64	653.52	653.54	653.54
MW-1102S									655.48	654.90		654.31		654.11
MW-1102D									654.68	654.05	653.65	653.55	653.58	653.54
MW-1103S									655.33	654.79		654.23		654.07
MW-1103M									654.72	654.11		653.57		653.62
MW-1103D									654.68	654.04	653.64	653.54	653.55	653.61
MW-1104S									655.14	654.66		654.08		653.93
MW-1104D									654.84	654.20	653.79	653.67	653.72	653.73
MW-1105D									654.87	654.26	653.85	653.73	653.77	653.79
MW-1106D									655.06	654.46	654.03	653.91	653.96	653.96
MW-1107D									654.87	654.32	653.90	653.78	653.81	653.78
MW-1108S									654.75	654.16		653.58	653.60	653.58
MW-1108D														
MW-1109									655.48	654.91		654.32		654.10
MW-1110S														654.03

TABLE 3-1
Static Water Levels

The Lockformer Company / Lisle, Illinois

Monitoring Well ID	GW Elev. Aug-98 (msl)	GW Elev. Feb-99 (msl)	GW Elev. Mar-99 (msl)	GW Elev. Dec-99 (msl)	GW Elev. Nov-00 (msl)	GW Elev. 12/19/2001 (msl)	GW Elev. 1/11/2001 (msl)	GW Elev. 3/21/2001 (msl)	GW Elev. 5/15/2001 (msl)	GW Elev. 6/27/2001 (msl)	GW Elev. 7/12/2001 (msl)	GW Elev. 8/10/2001 (msl)	GW Elev. 9/10/2001 (msl)	GW Elev. 9/20/2001 (msl)
MW-1110D													653.97	652.20
MW-1111S														654.01
MW-1111D													653.94	653.98
MW-1112S														654.18
MW-1112D													653.86	653.90
MW-1113S														653.52
MW-1113M														653.45
MW-1113D														653.46
MW-1114S														653.98
MW-1114D														653.98
MW-1115S														
MW-1115M														
MW-1115D														
MW-1116S														
MW-1116M														
MW-1116D														
MW-1117														
MW-1118														
MW-1119D														
MW1119M														
MW1119S														
MW-1120D														
MW-1121D														
MW-1122S														
MW-1122														
MW-1123														
MW-1600S														
MW-1600D														
MW-1601S														
MW-1601D														
MW-1602S														
MW-1602D														
MW-1603														
MW-1604														
MW-1604D														
MW-1605														
MW-1853														
MW-1855														
MW1915														
MW1919														
MW1923														
MW-2100D														
MW-2100M														
MW-2100S														
MW-2101														
MW-2102														
MW-2103														
MW2114														
MW2116														
MW2129														
MW2130D														
MW2130S														
MW2131D														
MW2131S														
MW2300D														
MW2300M														

TABLE 3-1
Static Water Levels

The Lockformer Company / Lisle, Illinois

Monitoring Well ID	GW Elev. Aug-98 (msl)	GW Elev. Feb-99 (msl)	GW Elev. Mar-99 (msl)	GW Elev. Dec-99 (msl)	GW Elev. Nov-00 (msl)	GW Elev. 12/19/2001 (msl)	GW Elev. 1/11/2001 (msl)	GW Elev. 3/21/2001 (msl)	GW Elev. 5/15/2001 (msl)	GW Elev. 6/27/2001 (msl)	GW Elev. 7/12/2001 (msl)	GW Elev. 8/10/2001 (msl)	GW Elev. 9/10/2001 (msl)	GW Elev. 9/20/2001 (msl)
MW2300S														
MW2301D														
MW2301M														
MW2301S														
MW2306														
MW2311														
MW2312S														
MW2312M														
RW1														
RW2														
RW3														
RW4														
RW5														
RW6														
RW7														
RW8														
RW9														
RW10														
RW11														
RW12														
SG-1								671.33	670.59	670.41		670.51	670.66	670.94
SG-2								666.99	666.44	666.32	666.27	666.41	666.51	666.72
SG-3								664.12	663.34	663.20	663.04	663.37	663.48	663.73
SG-4											664.34	664.53	664.74	666.46
SG-5											656.80	656.96	657.14	658.72
SG-6											651.93	652.40	652.71	654.98
[1] Downers Grove Public Water Supply Standby Production Wells														
Katrine Well											648.49		650.12	
Finley Well											669.08		667.20	
Downer Dr. Well											652.42		651.94	
67th St. Well											641.35		640.86	
71st St. Well											641.86		641.54	
63rd St. Well													646.77	

NOTES:
All top of casing elevations based on survey, unless otherwise noted.
Depth to groundwater measured from the top of the well casing.
Shaded cells = Not applicable
msl = mean sea level

TABLE 3-1
Static Water Levels

The Lockformer Company / Lisle, Illinois

Monitoring Well ID	GW Elev. 10/17/2001 (msl)	GW Elev. 11/30/2001 (msl)	GW Elev. 2/14/2002 (msl)	GW Elev. 3/20/2002 (msl)	GW Elev. 10/14/2002 (msl)	GW Elev. 11/8/2002 (msl)	GW Elev. 2/6/2003 (msl)	GW Elev. 3/28/2003 (msl)	GW Elev. 7/3/2003 (msl)	GW Elev. 9/24/2003 (msl)	GW Elev. 2/5/2004 (msl)	GW Elev. 6/1/2004 (msl)	GW Elev. 6/21/2004 (msl)
BW-1	654.20	653.78	652.65	653.58	652.63	652.04	651.04	651.09	651.93	651.68	651.22	652.67	653.53
BW-2	654.81	654.18	653.06	653.98	652.96	652.43	651.45	651.59	652.27	652.04	651.69	653.13	653.92
BW-3	654.95	654.31	653.20	654.12	652.95	652.64	651.57	651.72	652.46	652.21	652.13	653.33	654.10
P-1													
P-2													
P-3													
MW-101	699.78	698.76	698.49	700.23	697.50	697.13							
MW-104													
MW-105													
MW-120	666.83	666.89	672.11	670.03	666.76	666.28		657.20	657.26	657.44	657.36	659.02	659.49
MW-123	701.55	700.47	700.20	701.32	699.51	699.06		700.26	701.86	702.42	702.42	708.46	704.97
MW-126	655.16	654.60	653.47	654.37	653.10	652.84		651.82	652.60	652.37	652.14	653.54	654.27
MW-401	656.02	656.45	655.99	655.95	656.54	656.33		707.67					
MW-402	657.29	655.83	654.60	655.37	654.42	653.96		652.48	653.65	653.61	653.40	654.76	655.46
MW-403													
MW-500S													
MW-500D	656.08	655.57	654.36	655.08	654.27	653.86							
MW-501S													
MW-501D	656.06	656.23	655.51	655.86	655.62	655.35							
MW-502S	706.80	709.36	706.44	705.61	703.17	704.98		706.17	702.08	706.45	701.68	705.89	706.36
MW-503S													
MW-504S													
MW-504D	655.62	655.72	654.57	655.13	654.55	654.18		652.92	653.79	653.83	653.47	654.55	655.00
MW-505S													
MW-506S													
MW-507S													
MW-508S													
MW-508D	655.13	655.63	654.55	654.97	654.68	654.35		652.59	653.44	653.50	653.18	654.13	654.60
MW-513D	656.29	655.53	654.39	655.09	654.17	653.84		652.45	653.43	653.33	653.05	654.60	655.14
MW-514D	656.91				654.51	654.13		652.76	653.78	653.75	653.45	655.33	655.59
MW-515D	657.05	655.69	654.52	655.27	654.35	653.91		652.42	653.55	653.52	653.30	654.68	655.33
MW-516D	657.36	655.72	654.50	655.36	654.22	653.83		652.34	653.48	653.50	653.27	654.83	655.31
MW-517D	656.36	655.64	654.38	655.14	654.28	653.86		652.44	653.51	652.85	653.30	654.36	655.08
MW-518D													
MW-519D													
MW-520													
MW-521	655.11	655.30	654.11	654.93	653.96	653.64		652.34	653.37	653.26	653.16	654.02	654.69
MW-522	655.12	655.70	654.14	655.13	653.93	653.55		652.25	653.27	653.06	652.89	654.12	654.73
MW-1100S	658.09	655.92	654.76	655.63	654.47	654.01		652.74	653.81	653.81	653.47	655.65	655.34
MW-1100D	655.15	654.57	653.47	654.40	653.18	652.99		651.87	652.67	652.45	652.22	653.59	653.94
MW-1101S	657.72	655.91	654.80	655.64	654.45	654.01		652.72	653.81	653.82	653.47	655.77	656.11
MW-1101D	655.12	654.55	653.46	654.38	653.18	653.00		651.88	652.66	652.45	652.22	653.58	654.67
MW-1102S	656.37	655.27	654.36	655.22	653.99	653.62		652.48	653.46	653.46	653.20	654.38	655.15
MW-1102D	655.27	654.55	653.49	654.37	653.21	652.93		651.93	652.72	652.51	652.27	653.66	654.39
MW-1103S	656.07	654.62	654.30	655.11	653.87	653.54		652.43	653.39	653.35	653.18	654.42	655.00
MW-1103M	654.84	655.09	653.51	654.41	653.16	652.96		651.86	652.64	652.43	652.19	653.57	654.29
MW-1103D	655.65	654.56	653.48	654.35	653.22	653.02		651.93	652.71	652.50	652.27	653.69	654.35
MW-1104S	655.42	654.98	653.99	654.84	653.73	653.38		651.86	653.22	653.09	652.97	653.97	654.70
MW-1104D	655.42	654.69	653.60	654.52	653.33	653.14		652.04	652.84	652.63	652.41	653.82	654.53
MW-1105D	655.48	654.73	653.64	654.57	653.38	653.16		652.09	652.88	652.66	652.43	653.84	654.55
MW-1106D	655.70	664.88	653.80	654.76	653.56	653.34		652.19	653.05	652.85	652.62	653.99	654.71
MW-1107D	655.48	654.83	653.68	654.54	653.41	653.22		652.05	652.89	652.69	652.42	653.82	654.52
MW-1108S	655.24	654.66	653.51	654.41	653.18	652.99					652.32	653.71	654.35
MW-1108D	655.63	654.88	653.76	654.62	653.42	653.21					652.49	653.87	654.69
MW-1109	656.29	655.24	654.35	655.20	654.21	653.85		652.71	653.66	653.67	653.42	654.67	655.32
MW-1110S	655.82	654.97	653.86	654.82	653.56	653.29		652.30	653.00		652.58	653.99	654.69

TABLE 3-1
Static Water Levels

The Lockformer Company / Lisle, Illinois

Monitoring Well ID	GW Elev. 10/17/2001 (msl)	GW Elev. 11/30/2001 (msl)	GW Elev. 2/14/2002 (msl)	GW Elev. 3/20/2002 (msl)	GW Elev. 10/14/2002 (msl)	GW Elev. 11/8/2002 (msl)	GW Elev. 2/6/2003 (msl)	GW Elev. 3/28/2003 (msl)	GW Elev. 7/3/2003 (msl)	GW Elev. 9/24/2003 (msl)	GW Elev. 2/5/2004 (msl)	GW Elev. 6/1/2004 (msl)	GW Elev. 6/21/2004 (msl)
MW-1110D	655.83	654.95	653.83	654.83	653.55	653.29		652.31	653.13		652.68	654.12	654.81
MW-1111S	655.90	654.89	653.81	654.80	653.57	653.24		652.39	653.10		652.66	654.07	654.65
MW-1111D	655.75	654.93	653.78	654.76	653.47	653.25		652.25	652.85		652.40	653.85	654.54
MW-1112S	655.33	655.28	654.17	655.00	654.03	653.67		652.53	653.42		653.19	654.11	654.78
MW-1112D	655.64	654.91	653.74	654.69	653.43	653.18		652.24	652.81		652.38	653.80	654.50
MW-1113S	655.30	654.58	653.54	654.54	653.30	652.98		652.01	652.97	652.86	652.73	653.68	654.47
MW-1113M	655.07	654.51	653.44	655.32	653.05	652.80		651.77	652.63	652.40	652.17	653.53	654.28
MW-1113D	655.08	654.51	653.44	654.54	653.12	652.89		651.87	652.63	652.41	652.16	653.54	654.28
MW-1114S	655.76	654.89	653.85	654.76	653.53	653.22		652.17	652.97	652.75	652.54	653.95	654.63
MW-1114D	655.74	654.91	653.82	654.76	653.53	653.28		652.20	653.06	652.81	652.60	654.00	654.67
MW-1115S		654.34	653.24	654.17	653.01	652.73		651.81	652.49	652.25	652.03	653.41	654.15
MW-1115M					653.01	652.75		651.72	652.49	652.25	652.03	653.42	654.14
MW-1115D					653.12	652.82		651.78	652.54	652.30	652.07	653.49	654.20
MW-1116S		654.34	652.55	654.20	653.03	652.76		651.76	652.52	652.27	652.05	653.43	654.17
MW-1116M					653.04	652.77		651.76	652.51	652.26	652.05	653.42	654.16
MW-1116D					653.09	652.84		651.78	652.50	652.31	652.09	653.50	654.22
MW-1117					654.18	653.81		652.47	653.57	653.42	653.32	654.17	654.82
MW-1118					653.58	653.32		652.21	652.99	652.81	652.62	654.01	654.70
MW-1119D					653.10	652.80		651.80	652.53	652.31	652.08	653.50	654.21
MW1119M									652.46	652.21	651.99	653.38	654.12
MW1119S									652.49	652.24	652.02	653.39	654.14
MW-1120D					653.12	652.94		651.88	652.57	652.34	652.14	653.54	654.27
MW-1121D					653.11	652.82		651.83	652.55	652.33	652.10	653.51	654.23
MW-1122S											653.26	654.42	655.01
MW-1122						653.30		652.22	653.05	652.81	652.58	653.99	654.71
MW-1123								652.71	653.79		653.76	654.39	654.95
MW-1600S		652.04	650.76	651.58									
MW-1600D		651.91	650.63	651.66									
MW-1601S		653.16	651.65										
MW-1601D		652.69	651.29										
MW-1602S		654.00	652.77	653.60									
MW-1602D		653.68	652.42	653.33									
MW-1603		654.24	653.23	654.20	652.98	652.60	651.68	651.48	652.26	651.99	651.84	653.06	653.85
MW-1604		654.15	652.99	653.92	652.74	652.44	651.43	651.62	652.29	652.05	651.68	653.07	653.78
MW-1604D								651.56	652.30	652.05	651.73	653.13	653.94
MW-1605		654.07	652.92	653.80	652.77	652.37	651.30	651.45	652.16	651.94	651.56	652.89	653.74
MW-1853													
MW-1855													
MW1915									652.77	652.51	652.40	653.61	654.32
MW1919									655.47	654.87	655.25	656.33	656.91
MW1923									652.64	652.41	652.25	653.50	654.25
MW-2100D					653.11	652.81		651.78	652.53	652.31	652.07	653.50	654.22
MW-2100M					653.02	652.72		651.76	652.52	652.27	652.05	653.44	654.17
MW-2100S					653.02	652.73		651.75	652.51	652.26	652.04	653.43	654.16
MW-2101					653.05	652.77	651.78	651.75	652.53	652.28	652.06		654.18
MW-2102					653.05	652.77	651.78	651.78	652.52	652.27	652.05	653.44	654.17
MW-2103					653.06	652.51	651.79	651.78	652.53	652.28	652.06	653.44	654.17
MW2114									652.58	652.35	652.15	653.49	654.22
MW2116									653.05	652.98	652.76	653.99	654.82
MW2129									652.66		652.24	653.61	654.23
MW2130D									652.52		652.04	653.50	654.17
MW2130S									652.50		652.03	653.43	654.13
MW2131D									657.08		652.03	653.49	654.16
MW2131S									652.51		652.03	653.44	654.13
MW2300D									652.47	652.22	651.92	653.32	654.09
MW2300M									652.54	652.27	651.97	653.52	654.13

TABLE 3-1
Static Water Levels

The Lockformer Company / Lisle, Illinois

Monitoring Well ID	GW Elev. 10/17/2001 (msl)	GW Elev. 11/30/2001 (msl)	GW Elev. 2/14/2002 (msl)	GW Elev. 3/20/2002 (msl)	GW Elev. 10/14/2002 (msl)	GW Elev. 11/8/2002 (msl)	GW Elev. 2/6/2003 (msl)	GW Elev. 3/28/2003 (msl)	GW Elev. 7/3/2003 (msl)	GW Elev. 9/24/2003 (msl)	GW Elev. 2/5/2004 (msl)	GW Elev. 6/1/2004 (msl)	GW Elev. 6/21/2004 (msl)
MW2300S									652.57	652.28	652.03	653.61	654.16
MW2301D									652.44	652.19	650.90	653.30	654.07
MW2301M									652.51	652.24	652.95	653.39	654.12
MW2301S									652.52	652.24	651.95	653.41	654.13
MW2306									652.53	652.25	651.98	653.45	654.14
MW2311									652.45	652.17	651.88	653.32	654.07
MW2312S													659.38
MW2312M													654.09
RW1						650.16		648.98	649.71	649.44	648.81	650.33	
RW2						650.22		649.08	649.79	649.51	648.90	650.39	
RW3						650.34		649.19	649.88	649.61	649.01	650.49	
RW4						650.44		649.29	649.99	649.71	649.11	650.59	
RW5						650.50		649.37	650.07	649.82	649.10	650.66	
RW6						649.34		648.16	648.88	648.58	647.92	649.48	
RW7								647.98	648.73	648.38	648.02	649.60	
RW8								648.00	648.74	648.39	647.95	649.54	
RW9								647.94	648.68	648.35	647.86	649.42	
RW10								647.86	648.61	648.28	647.75	649.31	
RW11								647.62	648.39	648.07	647.55	648.11	
RW12									648.17	647.87	647.24	648.78	
SG-1	670.98	670.85	670.71	670.60	670.04	670.10		671.30		670.43		671.17	
SG-2	666.93	666.83	666.65	666.57	666.14	666.35		666.93	666.21	666.33		666.90	666.39
SG-3	663.71	663.64	663.46	663.42	663.16	663.35		663.95	663.16	663.29		663.96	663.39
SG-4	665.61	665.20	664.64	664.61	664.49	664.40		664.68	664.31	664.45	664.30	666.65	664.50
SG-5	658.09	657.42	657.02	657.02	656.69	656.77		657.25	656.53	656.78	656.69	658.88	656.90
SG-6	654.26	653.16	652.68	652.47	651.96	652.03		652.82	652.00	652.07	652.05	655.38	655.40
[1] Downers Grove													
Katrine Well		649.81	648.19	649.14		648.16		646.96	647.71	647.07	647.34	646.66	
Finley Well		670.35	669.78	671.10		667.84		667.56	667.67	666.35	668.09		
Downer Dr. Well		653.41	652.43	652.56		652.05		650.99	651.36	650.81	651.13	651.66	
67th St. Well		642.19	641.34	641.15		641.25		640.40	640.55	639.95	640.25	640.47	
71st St. Well		643.09	641.83	642.09		641.22		640.20	640.78	639.91	640.41	641.20	
63rd St. Well		647.12	645.99	646.01		645.27		644.34	644.70	643.98	644.63	645.22	

TABLE 3-2
Master General Chemistry Table

The Lockformer Company / Lisle, Illinois

PARAMETERS	BW1	BW2	BW3	MW101		MW120		MW123		MW126	
	8/5/02	8/2/02	8/1/02	6/21/01	8/27/02	6/21/01	8/16/02	6/20/01	8/19/02	6/15/01	8/9/02
Chloride	226	190	264	250	218	268	338	1,600	1,420	380	325
Chemical Oxygen Demand	<10	<10	10	26	37	15	16	<10	<10	<10	<10
Nitrate	0.15	0.13	0.39	<0.10	<0.10	<0.10	<0.10	0.64	<0.10	0.5	0.37
Sulfate	157	192	129	226	207	400	470	69	82	86	125
Sulfide	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Total Organic Carbon	6.8	6.5	6.4	3.07	12	4.32	4.6	1.66	7.8	1.2	7.8
Iron	0.15	0.02	<0.01	<0.01	0.21	<0.01	<0.01	0.14	0.13	0.09	0.28
Manganese	0.020	0.028	0.006	0.194	0.241	<0.001	0.068	0.101	0.296	0.009	0.065
Dissolved Oxygen	0	0	0	8.07	0	0.68	3.54	5.2		0	0
Oxygen Reduction Potential	-73	-104	13	81	-7	-22	99	14		-8	-66
Ethane	<0.020	<0.020	<0.020	<0.016	<0.020	<0.016	<0.020	<0.016	<0.020	<0.016	<0.020
Ethene	<0.020	<0.020	<0.020	<0.015	<0.020	<0.015	<0.020	<0.015	<0.020	<0.015	<0.020
BOD											

NOTES:

MW-1101D	= Sample Location
64.5-73.5	= Depth of sample in feet below top of casing (if applicable)
9/9/02	= Sample Date

NA = Not Analyzed

Values expressed in milligrams per liter (mg/L), except Oxygen Reduction Potential, which is expressed in milliVolts.

TABLE 3-2
Master General Chemistry Table

The Lockformer Company / Lisle, Illinois

PARAMETERS	MW401		MW402		MW500D		MW501D		MW502S	MW502D
	6/15/01	8/14/02	6/19/01	8/20/02	6/21/01	8/26/02	6/19/01	8/19/02	6/14/01	8/14/02
Chloride	268	197	233	180	582	329	411	449	8	13
Chemical Oxygen Demand	<10	<10	<10	<10	<10	<10	<10	<10	25	<10
Nitrate	<0.10	<0.10	0.25	<0.10	<0.10	<0.10	0.88	<0.10	<0.10	<0.10
Sulfate	490	402	203	134	140	97	480	367	30	35
Sulfide	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Total Organic Carbon	1.4	2.1	1.19	3.1	2.01	7.0	1.06	13	4.6	4.1
Iron	0.24	0.42	0.02	0.51	0.42	0.43	0.02	0.95	0.06	2.36
Manganese	0.222	0.119	0.322	0.169	0.026	0.047	0.151	0.215	0.057	0.410
Dissolved Oxygen	1.41	1.49	0.88	1.71	0.91	0	4.87		4.44	0
Oxygen Reduction Potential	11	71	45	-6	-24	-18	71		111	-116
Ethane	<0.016	<0.020	<0.016	<0.020	<0.016	<0.020	<0.016	<0.020	<0.016	<0.020
Ethene	<0.015	<0.020	<0.015	<0.020	<0.015	<0.020	<0.015	<0.020	<0.015	<0.020
BOD										

NOTES:

MW-1101D	= Sample Location
64.5-73.5	= Depth of sample in feet below top of casing (if applicable)
9/9/02	= Sample Date

NA = Not Analyzed

Values expressed in milligrams per liter (mg/L), except Oxygen Reduction Potential, which is expressed in milliVolts.

TABLE 3-2
Master General Chemistry Table

The Lockformer Company / Lisle, Illinois

PARAMETERS	MW504D		MW508D		MW513D		MW514D	MW515D		MW516D	
	6/13/01	8/14/02	6/12/01	8/14/02	6/12/01	8/13/02	6/14/01	6/14/01	8/16/02	6/20/01	8/21/02
Chloride	475	250	81	104	116	113	98	266	176	817	108
Chemical Oxygen Demand	12	<10	<10	<10	11	<10	<10	10	<10	<10	<10
Nitrate	1.32	0.62	2.25	1.77	<0.10	<0.10	<0.10	<0.10	<0.10	0.25	0.12
Sulfate	140	121	95	147	183	160	154	163	90	124	88
Sulfide	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Total Organic Carbon	2.2	5.8	1.8	11	1.2	7.3	1.2	1.2	4.7	1.64	6
Iron	1.38	1.11	0.01	0.18	<0.01	2.55	0.56	1.16	1.49	0.28	0.28
Manganese	0.226	0.032	0.202	0.032	0.024	0.031	0.039	0.148	0.101	0.032	0.028
Dissolved Oxygen	0.7	1.4	0.46	2.22	0.09	0	0	0	0	0.63	1.23
Oxygen Reduction Potential	19	-5	129	18	-64	-118	-42	-39	-64	4	6
Ethane	<0.016	<0.020	<0.016	<0.020	<0.016	<0.020	<0.016	<0.016	<0.020	<0.016	<0.020
Ethene	<0.015	<0.020	<0.015	<0.020	<0.015	<0.020	<0.015	<0.015	<0.020	<0.015	<0.020
BOD											

NOTES:

MW-1101D	= Sample Location
64.5-73.5	= Depth of sample in feet below top of casing (if applicable)
9/9/02	= Sample Date

NA = Not Analyzed

Values expressed in milligrams per liter (mg/L), except Oxygen Reduction Potential, which is expressed in milliVolts.

TABLE 3-2
Master General Chemistry Table

The Lockformer Company / Lisle, Illinois

PARAMETERS	MW517D		MW521		MW522		MW1100S		MW1100D	MW1101S	
	6/19/01	8/21/02	6/18/01	8/20/02	6/18/01	8/26/02	6/11/01	8/8/02	9/9/02	6/11/01	8/9/02
Chloride	389	138	311	305	76	99	66	82	310	29	31
Chemical Oxygen Demand	<10	<10	<10	<10	<10	<10	12	<10	<10	10	<10
Nitrate	<0.10	<0.10	0.11	<0.10	0.14	<0.10	<0.10	<0.10	1.15	<0.10	<0.10
Sulfate	317	94	314	323	132	132	95	57	130	98	45
Sulfide	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Total Organic Carbon	1.16	3.4	1.3	5.5	1.6	7.1	1.2	16	6.3	1.3	23
Iron	0.81	1.96	0.03	<0.01	0.06	0.02	0.47	1.42	0.15	<0.01	1.44
Manganese	0.32	0.227	0.01	0.016	0.049	0.059	0.018	0.300	0.007	0.335	0.220
Dissolved Oxygen	0	0	1.06	0	0.83	0.8	1.12	0	0.68	0	0
Oxygen Reduction Potential	-29	-88	63	119	43	230	79	-75	-33	31	-73
Ethane	<0.016	<0.020	<0.016	<0.020	<0.016	<0.020	<0.016	<0.020	<0.020	<0.016	<0.020
Ethene	<0.015	<0.020	<0.015	<0.020	<0.015	<0.020	<0.015	<0.020	<0.020	<0.015	<0.020
BOD											

NOTES:

MW-1101D	= Sample Location
64.5-73.5	= *Depth of sample in feet below top of casing (if applicable)*
9/9/02	= Sample Date

NA = Not Analyzed

Values expressed in milligrams per liter (mg/L), except Oxygen Reduction Potential, which is expressed in milliVolts.

TABLE 3-2
Master General Chemistry Table

The Lockformer Company / Lisle, Illinois

PARAMETERS	MW1101D			MW1102S						
	64.5-73.5 9/9/02	75-83 9/9/02	83-91 9/9/02	6/6/01	8/9/02					
Chloride	303	298	280	188	111					
Chemical Oxygen Demand	<10	<10	<10	<10	<10					
Nitrate	0.66	1.23	0.63	<0.10	<0.10					
Sulfate	134	131	148	163	105					
Sulfide	<0.05	<0.05	<0.05	<0.05	<0.05					
Total Organic Carbon	6.4	6.8	3.5	3.4	3.2					
Iron	0.40	0.20	0.22	1.31	2.44					
Manganese	0.008	0.009	0.020	0.215	0.137					
Dissolved Oxygen	0.01	0.69	0.43	0	0					
Oxygen Reduction Potential	-94	-30	-64	-63	-169					
Ethane	<0.020	<0.020	<0.020	<0.016	<0.020					
Ethene	<0.020	<0.020	<0.020	<0.015	<0.020					
BOD										

NOTES:

MW-1101D	= Sample Location
64.5-73.5	= Depth of sample in feet below top of casing (if applicable)
9/9/02	= Sample Date

NA = Not Analyzed

Values expressed in milligrams per liter (mg/L), except Oxygen Reduction Potential, which is expressed in milliVolts.

TABLE 3-2
Master General Chemistry Table

The Lockformer Company / Lisle, Illinois

PARAMETERS	MW1102D									MW1103S	
	73-81 9/4/02	83-91 9/4/02	91.5-99.5 9/3/02	97.5-105.5 9/3/02	105.5-113.5 8/29/02	113.5-121.5 8/29/02	123.5-131.5 8/29/02	132.5-140.5 8/28/02	142.5-150.5 8/28/02	6/6/01	8/12/02
Chloride	278	284	294	259	279	283	292	273	292	120	136
Chemical Oxygen Demand	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Nitrate	0.25	0.27	0.40	0.24	0.35	0.31	0.33	0.27	0.28	0.1	0.17
Sulfate	111	139	113	130	113	109	112	104	97	124	100
Sulfide	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Total Organic Carbon	9.5	5.6	8.1	6.6	5.7	14	5.2	5.3	5.3	4.8	10
Iron	0.85	0.44	0.42	0.52	0.22	0.47	0.18	0.07	0.12	0.26	3.34
Manganese	0.015	0.012	0.031	0.017	0.011	0.046	0.012	0.014	0.018	0.201	0.126
Dissolved Oxygen	0	0.15	0.07	0.9	0	0	0	0	0	0	0
Oxygen Reduction Potential	-127	-100	-100	-108	-62	-91	-67	-39	-61	20	-92
Ethane	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.016	<0.020
Ethene	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.015	<0.020
BOD											

NOTES:

MW-1101D	= Sample Location
64.5-73.5	= Depth of sample in feet below top of casing (if applicable)
9/9/02	= Sample Date

NA = Not Analyzed

Values expressed in milligrams per liter (mg/L), except Oxygen Reduction Potential, which is expressed in milliVolts.

TABLE 3-2
Master General Chemistry Table

The Lockformer Company / Lisle, Illinois

PARAMETERS	MW1103M		MW1103D								
	6/5/01	8/12/02	73.5-81.5 9/5/02	78.5-86.5 9/5/02	84-92 9/5/02	95-103 9/5/02	103-111 9/5/02	111-119 9/5/02	119-127 9/4/02	128.5-136.5 9/4/02	136.5-144.5 9/4/02
Chloride	494	447	280	289	283	235	236	229	273	265	249
Chemical Oxygen Demand	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Nitrate	<0.10	<0.10	0.26	0.21	0.11	0.12	0.13	0.13	0.34	0.14	<0.10
Sulfate	198	179	136	132	136	169	170	167	118	118	136
Sulfide	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Total Organic Carbon	2.8	9.5	4.8	5.0	5.0	4.3	4.8	5.4	5.2	5.6	9.1
Iron	0.67	0.80	0.37	0.13	0.21	0.46	0.50	0.42	0.32	0.16	0.26
Manganese	0.162	0.082	0.008	0.008	0.020	0.026	0.028	0.026	0.016	0.020	0.019
Dissolved Oxygen	0	0	0	0.13	0.56	0.85	0.62	0.49	0.56	0.64	0.11
Oxygen Reduction Potential	-108	-115	-96	0.63	-74	-107	-102	-100	-67	-58	-81
Ethane	<0.016	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Ethene	<0.015	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
BOD											

NOTES:

MW-1101D	= Sample Location
64.5-73.5	= Depth of sample in feet below top of casing (if applicable)
9/9/02	= Sample Date

NA = Not Analyzed

Values expressed in milligrams per liter (mg/L), except Oxygen Reduction Potential, which is expressed in milliVolts.

TABLE 3-2
Master General Chemistry Table

The Lockformer Company / Lisle, Illinois

PARAMETERS	MW1104S		MW1104D			MW1105D			MW1107D		
	6/6/01	8/12/02	73.5-81.5 9/10/02	79.5-87.5 9/10/02	86.5-94.5 9/10/02	80-88 9/10/02	88-96 9/10/02	90-98 9/10/02	81-89 9/12/02	88-96 9/12/02	95-103 9/12/02
Chloride	103	131	280	282	280	286	277	281	320	332	347
Chemical Oxygen Demand	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Nitrate	0.27	0.36	0.21	0.22	<0.10	0.22	0.17	0.17	1.02	1.02	0.96
Sulfate	96	103	106	98	103	125	159	161	116	117	118
Sulfide	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Total Organic Carbon	4.6	6.6	6.1	6.6	7.5	4.8	3.5	3.1	4.5	4.6	3.5
Iron	0.24	1.91	0.24	0.13	0.25	0.36	0.18	0.28	0.16	0.11	0.12
Manganese	0.144	0.178	0.005	0.005	0.026	0.013	0.028	0.028	0.004	0.003	0.007
Dissolved Oxygen	0.11	0	0	0.13	0	0.27	0.11	0.49	2.4	2.76	2.66
Oxygen Reduction Potential	38	-53	-85	-62	-91	-94	-76	-80	60	89	76
Ethane	<0.016	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Ethene	<0.015	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
BOD											

NOTES:

MW-1101D	= *Sample Location*
64.5-73.5	= Depth of sample in feet below top of casing (if applicable)
9/9/02	= Sample Date

NA = Not Analyzed

Values expressed in milligrams per liter (mg/L), except Oxygen Reduction Potential, which is expressed in milliVolts.

TABLE 3-2
Master General Chemistry Table

The Lockformer Company / Lisle, Illinois

PARAMETERS	MW1108S		MW1108D		MW1109		MW1110S		MW1110D	
	6/12/01	8/8/02	90-98 8/28/02	96.5-104.5 8/27/02	6/19/01	8/7/02	9/25/01	8/15/02	58-66 11/14/02	66-74 11/14/02
Chloride	289	164	274	280	156	142	98	31	253	234
Chemical Oxygen Demand	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Nitrate	1.02	<0.10	1.91	2.00	0.87	0.74	<0.10	<0.10	<0.10	<0.10
Sulfate	156	209	91	91	126	102	75	75	127	97
Sulfide	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Total Organic Carbon	1.4	12	7.0	4.4	2.2	3.4	1.1	4.2	3.0	2.9
Iron	1.03	3.63	<0.01	0.01	0.06	0.55	0.67	1.33	0.12	0.12
Manganese	0.04	0.081	0.007	0.006	0.39	0.116	0.255	0.048	0.062	0.041
Dissolved Oxygen	0.61	0	1.78	1.68	0	0	0.36	0	0	0
Oxygen Reduction Potential	-27	-112	55	95	-29	-68	-104	-141	-69	-142
Ethane	<0.016	<0.020	<0.020	<0.020	<0.016	<0.020	<0.016	<0.020	<0.020	<0.020
Ethene	<0.015	<0.020	<0.020	<0.020	<0.015	<0.020	<0.015	<0.020	<0.020	<0.020
BOD										

NOTES:

MW-1101D	= Sample Location
64.5-73.5	= Depth of sample in feet below top of casing (if applicable)
9/9/02	= Sample Date

NA = Not Analyzed

Values expressed in milligrams per liter (mg/L), except Oxygen Reduction Potential, which is expressed in milliVolts.

TABLE 3-2
Master General Chemistry Table

The Lockformer Company / Lisle, Illinois

PARAMETERS	MW1111S		MW1111D		MW1112S		MW1112D		MW1113S	
	9/25/01	8/15/02	57-65 11/14/02	65-73 11/14/02	9/25/01	8/15/02	56.1-64.1 11/15/02	65.6-73.6 11/15/02	9/26/01	8/6/02
Chloride	118	152	252	259	88	133	255	269	104	72
Chemical Oxygen Demand	<10	<10	<10	<10	<10	<10	<10	<10	<10	11
Nitrate	2.44	2.78	<0.10	<0.10	<0.10	0.17	0.11	0.10	0.16	<0.10
Sulfate	87	112	135	134	203	189	109	121	350	176
Sulfide	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Total Organic Carbon	1	5.4	3.0	3.4	1.1	5.4	3.7	2.7	2.5	13
Iron	0.01	0.93	0.14	0.38	0.02	0.31	0.05	0.15	0.02	2.98
Manganese	0.047	0.025	0.146	0.130	0.224	0.182	0.002	0.008	0.471	0.252
Dissolved Oxygen	1.31	0.18	0.19	0	0	0	0	0	3.72	0.48
Oxygen Reduction Potential	87	-38	-40	-116	42	-42	-43	-64	75	-55
Ethane	<0.016	<0.020	<0.020	<0.020	<0.016	<0.020	<0.020	<0.020	<0.016	<0.020
Ethene	<0.015	<0.020	<0.020	<0.020	<0.015	<0.020	<0.020	<0.020	<0.015	<0.020
BOD										

NOTES:

MW-1101D	= Sample Location
64.5-73.5	= Depth of sample in feet below top of casing (if applicable)
9/9/02	= Sample Date

NA = Not Analyzed

Values expressed in milligrams per liter (mg/L), except Oxygen Reduction Potential, which is expressed in milliVolts.

TABLE 3-2
Master General Chemistry Table

The Lockformer Company / Lisle, Illinois

PARAMETERS	MW1113M			MW1113D			MW1114S		MW1114D		
	9/26/01	Duplicate 4 9/26/01	8/6/02	64.5-72.5 8/27/02	74.5-82.5 8/27/02	80-88 8/26/02	9/26/01	8/7/02	74.3-82.3 9/11/02	78.3-86.3 9/11/02	86.3-94.3 9/11/02
Chloride	337	311	308	292	272	276	116	84	300	330	301
Chemical Oxygen Demand	<10	<10	<10	11	<10	<10	<10	<10	<10	<10	<10
Nitrate	0.25	0.28	0.81	0.55	0.15	0.15	<0.10	<0.10	0.67	0.83	0.63
Sulfate	106	104	117	84	90	100	135	156	96	100	92
Sulfide	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Total Organic Carbon	1.2	1.2	3.0	6.3	6.5	5.6	2.3	14	11	6.1	4.5
Iron	0.16	0.16	1.31	0.35	0.06	<0.01	0.04	0.97	0.10	0.10	0.35
Manganese	0.053	0.052	0.062	0.015	0.027	0.029	0.136	0.078	0.002	0.003	0.008
Dissolved Oxygen	0	0	0	0	0.1	0.89	0	0	0.03	0.11	0.47
Oxygen Reduction Potential	-37	-37	-125	-110	-35	-44	-87	-132	-36	-33	-70
Ethane	<0.016	<0.016	<0.020	<0.020	<0.020	<0.020	<0.016	<0.020	<0.020	<0.020	<0.020
Ethene	<0.015	<0.015	<0.020	<0.020	<0.020	<0.020	<0.015	<0.020	<0.020	<0.020	<0.020
BOD											

NOTES:

MW-1101D	= Sample Location
64.5-73.5	= Depth of sample in feet below top of casing (if applicable)
9/9/02	= Sample Date

NA = Not Analyzed

Values expressed in milligrams per liter (mg/L), except Oxygen Reduction Potential, which is expressed in milliVolts.

TABLE 3-2
Master General Chemistry Table

The Lockformer Company / Lisle, Illinois

PARAMETERS	MW1115	MW1115S	MW1115M	MW1115D					MW1116	MW1116S	MW1116M
				59-67	67-75	75-83	87-95	95-103			
	11/27/01	7/29/02	7/30/02	8/14/02	8/13/02	8/8/02	8/7/02	8/7/02	11/27/01	7/31/02	7/31/02
Chloride	82	80	126.0	307	271	280	254	257	196	176	155
Chemical Oxygen Demand	<10	<10	<10	<10	<10	12	<10	<10	<10	<10	<10
Nitrate	1.49	3.33	2.34	0.72	0.52	0.68	0.58	0.52	1.51	1.42	0.72
Sulfate	169	172	178.0	118	125	129	144	143	106	80	120
Sulfide	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Total Organic Carbon	18	1.9	1.8	2.7	4.5	2.9	3.0	6.3	9	3.3	3.3
Iron	0.01	0.04	<0.01	0.47	0.41	0.43	0.42	0.05	0.04	0.02	<0.01
Manganese	0.282	0.009	0.006	0.013	0.027	0.033	0.039	0.048	0.062	0.004	0.012
Dissolved Oxygen	3.82	3.85	1.34	0	0	0	0	0	4.86	4.63	1.45
Oxygen Reduction Potential	204	207	204	-83	-57	-81	-97	26	123	228	125
Ethane	<0.016	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.016	<0.020	<0.020
Ethene	<0.015	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.015	<0.020	<0.020
BOD											

NOTES:

MW-1101D	= Sample Location
64.5-73.5	= *Depth of sample in feet below top of casing (if applicable)*
9/9/02	= Sample Date

NA = Not Analyzed

Values expressed in milligrams per liter (mg/L), except Oxygen Reduction Potential, which is expressed in milliVolts.

TABLE 3-2
Master General Chemistry Table

The Lockformer Company / Lisle, Illinois

PARAMETERS	MW1116D						MW1117	MW1118	MW1119S
	57-65 8/26/02	65-73 8/21/02	73-81 8/21/02	81-89 8/20/02	89-97 8/20/02	97-105 8/20/02	11/1/02	11/1/02	7/1/03
Chloride	303	317	296	278	293	300	86	288	116
Chemical Oxygen Demand	<10	<10	<10	<10	<10	<10	<10	<10	<10
Nitrate	1.29	1.27	1.23	0.87	0.88	0.93	<0.10	0.72	0.69
Sulfate	106	111	107	138	122	122	136	112	112
Sulfide	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Total Organic Carbon	4.1	4.3	6.8	5.6	5.9	7.2	6.1	4.9	0.6
Iron	0.68	0.14	0.07	0.51	0.43	0.07	0.18	0.35	<0.01
Manganese	0.014	0.006	0.014	0.051	0.036	0.026	0.238	0.066	0.005
Dissolved Oxygen	0.66	0.55	0.46	0	0.27	1.15	0.81	0	
Oxygen Reduction Potential	-62	-21	66	-61	-55	12	-41	-66	
Ethane	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	
Ethene	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	
BOD									1

NOTES:

MW-1101D	= Sample Location
64.5-73.5	= Depth of sample in feet below top of casing (if applicable)
9/9/02	= Sample Date

NA = Not Analyzed

Values expressed in milligrams per liter (mg/L), except Oxygen Reduction Potential, which is expressed in milliVolts.

TABLE 3-2
Master General Chemistry Table

The Lockformer Company / Lisle, Illinois

PARAMETERS	MW1119D						MW1120D				
	61-68 11/13/02	69-77 11/13/02	77-85 11/13/02	85-93 11/12/02	93-101 11/12/02	101-109 11/12/02	55-63 11/7/02	63-71 11/7/02	71-79 11/7/02	79-87 11/7/02	87-95 11/6/02
Chloride	292	270	243	211	237	254	268	227	212	222	216
Chemical Oxygen Demand	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Nitrate	0.53	0.33	0.30	0.12	0.11	0.18	0.32	0.26	0.35	0.43	0.23
Sulfate	112	130	96	117	116	99	101	135	131	78	111
Sulfide	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Total Organic Carbon	3.2	3.7	15	16	2.0	1.6	4.3	6.3	4.8	4.8	7.3
Iron	0.30	2.19	2.45	1.46	0.75	0.38	0.29	0.67	0.70	0.18	0.31
Manganese	0.009	0.041	0.060	0.046	0.055	0.038	0.012	0.021	0.021	0.012	0.022
Dissolved Oxygen	0	0	0	0	0	0	0	0	0.02	0.21	0
Oxygen Reduction Potential	-78	-134	-139	-119	-111	-76	-79	-111	-97	-56	-85
Ethane	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Ethene	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
BOD											

NOTES:

MW-1101D	= Sample Location
64.5-73.5	= Depth of sample in feet below top of casing (if applicable)
9/9/02	= Sample Date

NA = Not Analyzed

Values expressed in milligrams per liter (mg/L), except Oxygen Reduction Potential, which is expressed in milliVolts.

TABLE 3-2
Master General Chemistry Table

The Lockformer Company / Lisle, Illinois

PARAMETERS	MW1121					MW1122	MW1123	MW1600S	MW1601S	MW1602S	
	61-69 11/12/02	69-77 11/11/02	77-85 11/11/02	85-93 11/11/02	93-101 11/11/02	1/30/03	1/30/03	11/26/01	11/27/01	11/26/01	Duplicate 6 11/26/01
Chloride	272	281	255	253	253	184	164	232	316	144	144
Chemical Oxygen Demand	<10	<10	<10	<10	<10	<10	<10	<10	13	<10	<10
Nitrate	0.53	0.70	0.58	0.55	0.53	<0.10	5.87	0.85	1.73	1.82	1.78
Sulfate	105	93	114	125	122	116	183	136	89	44	44
Sulfide	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Total Organic Carbon	3.7	4.8	4.4	3.5	4.0	5.9	9.2	9.8	16	5.1	7.6
Iron	1.20	0.69	0.34	0.87	0.89	0.06	0.25	0.08	<0.01	<0.01	<0.01
Manganese	0.041	0.023	0.011	0.023	0.032	0.110	0.083	0.027	0.05	0.002	0.002
Dissolved Oxygen	0	0	0.12	0.12	0.18	0.65	2.5	0	3.38	7.09	7.09
Oxygen Reduction Potential	-78	-96	-74	-80	-86	45	41	1	185	201	201
Ethane	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.016	<0.016	<0.016	<0.016
Ethene	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.015	<0.015	<0.015	<0.015
BOD											

NOTES:

MW-1101D	= Sample Location
64.5-73.5	= Depth of sample in feet below top of casing (if applicable)
9/9/02	= Sample Date

NA = Not Analyzed

Values expressed in milligrams per liter (mg/L), except Oxygen Reduction Potential, which is expressed in milliVolts.

TABLE 3-2
Master General Chemistry Table

The Lockformer Company / Lisle, Illinois

PARAMETERS	MW1603 8/1/02	MW1604 8/2/02	MW1605 8/2/02	MW1915 6/30/03	MW1919 7/1/03	MW1923 6/30/03	MW2100S 7/30/03	MW2100M 7/30/02
Chloride	290	200	137	120	150	84	139	135
Chemical Oxygen Demand	<10	<10	<10	<10	<10	<10	<10	<10
Nitrate	1.22	1.02	<0.10	0.90	<0.10	<0.10	1.12	0.69
Sulfate	150	165	159	186	75	600	108	178
Sulfide	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Total Organic Carbon	6.8	12	6.3	1.4	2.8	2.0	2.0	4.6
Iron	<0.01	0.67	1.33	0.03	0.04	0.13	0.04	0.02
Manganese	0.149	0.029	0.044	0.033	0.129	0.211	0.004	0.034
Dissolved Oxygen	0.48	0	1.71				2.94	0.16
Oxygen Reduction Potential	-3	-78	-120				71	99
Ethane	<0.020	<0.020	<0.020				<0.020	<0.020
Ethene	<0.020	<0.020	<0.020				<0.020	<0.020
BOD				2	1	1		

NOTES:

MW-1101D	= Sample Location
64.5-73.5	= Depth of sample in feet below top of casing (if applicable)
9/9/02	= Sample Date

NA = Not Analyzed

Values expressed in milligrams per liter (mg/L), except Oxygen Reduction Potential, which is expressed in milliVolts.

TABLE 3-2
Master General Chemistry Table

The Lockformer Company / Lisle, Illinois

PARAMETERS	MW2100D						MW2101	MW2102	MW2103	MW2129S	MW2130S	MW2131S
	57-65 8/19/02	65-73 8/16/02	73-81 8/15/02	81-89 8/15/02	89-97 8/15/02	97-105 8/15/02	10/31/02	10/31/02	10/31/02	7/1/03	7/1/03	7/1/03
Chloride	313	294	268	192	230	277	260	233	212	440	200	294
Chemical Oxygen Demand	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Nitrate	1.19	1.09	1.02	0.54	0.78	1.25	0.56	1.11	0.98	<0.10	0.81	0.94
Sulfate	110	115	110	135	127	113	128	133	128	262	143	74
Sulfide	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Total Organic Carbon	4.3	4.5	5.3	3.8	4.8	4.0	4.0	5.8	4.8	0.5	0.8	0.6
Iron	0.78	0.32	0.21	0.27	0.28	0.11	0.61	0.71	0.51	0.09	0.09	<0.01
Manganese	0.013	0.011	0.011	0.015	0.019	0.005	0.057	0.041	0.046	0.200	0.233	0.024
Dissolved Oxygen	0.26	0.05	0.83	0.46	0.23	1	2.82	1.08	1.58			
Oxygen Reduction Potential	-75	-58	-51	-63	-64	22	-81	-27	-20			
Ethane	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020			
Ethene	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020			
BOD										1	2	2

NOTES:

MW-1101D	= Sample Location
64.5-73.5	= Depth of sample in feet below top of casing (if applicable)
9/9/02	= Sample Date

NA = Not Analyzed

Values expressed in milligrams per liter (mg/L), except Oxygen Reduction Potential, which is expressed in milliVolts.

TABLE 3-2
Master General Chemistry Table

The Lockformer Company / Lisle, Illinois

PARAMETERS	MW2300S	MW2300M	MW2300D	MW2301S	MW2301M	MW2301D		MW2306	RW-1	RW-2	RW-3	RW-11
							Dup-70					
	6/24/03	6/24/03	6/24/03	6/25/03	6/25/03	6/25/03	6/25/03	6/30/03	4/23/03	4/1/03	4/8/03	3/24/03
Chloride	639	321	287	607	606	356	367	740		NA	NA	NA
Chemical Oxygen Demand	10	11	<10	<10	<10	<10	<10	<10		NA	NA	NA
Nitrate	3.30	6.65	0.98	1.33	1.30	0.32	0.36	1.32	<0.10	0.95	0.16	0.44
Sulfate	76	80	109	88	88	120	119	70		NA	NA	NA
Sulfide	NA	NA	NA	<0.05	<0.05	<0.05	<0.05	<0.05		NA	NA	NA
Total Organic Carbon	0.7	0.8	0.7	1.0	1.1	0.8	1.0	0.59		NA	NA	NA
Iron	0.05	<0.01	<0.01	0.14	<0.01	0.11	0.11	0.02		NA	NA	NA
Manganese	0.124	0.146	0.001	0.020	0.036	0.032	0.031	0.009		NA	NA	NA
Dissolved Oxygen										NA	NA	NA
Oxygen Reduction Potential										NA	NA	NA
Ethane										NA	NA	NA
Ethene										NA	NA	NA
BOD	<1	<1	2	2	2	2	2	1				

NOTES:

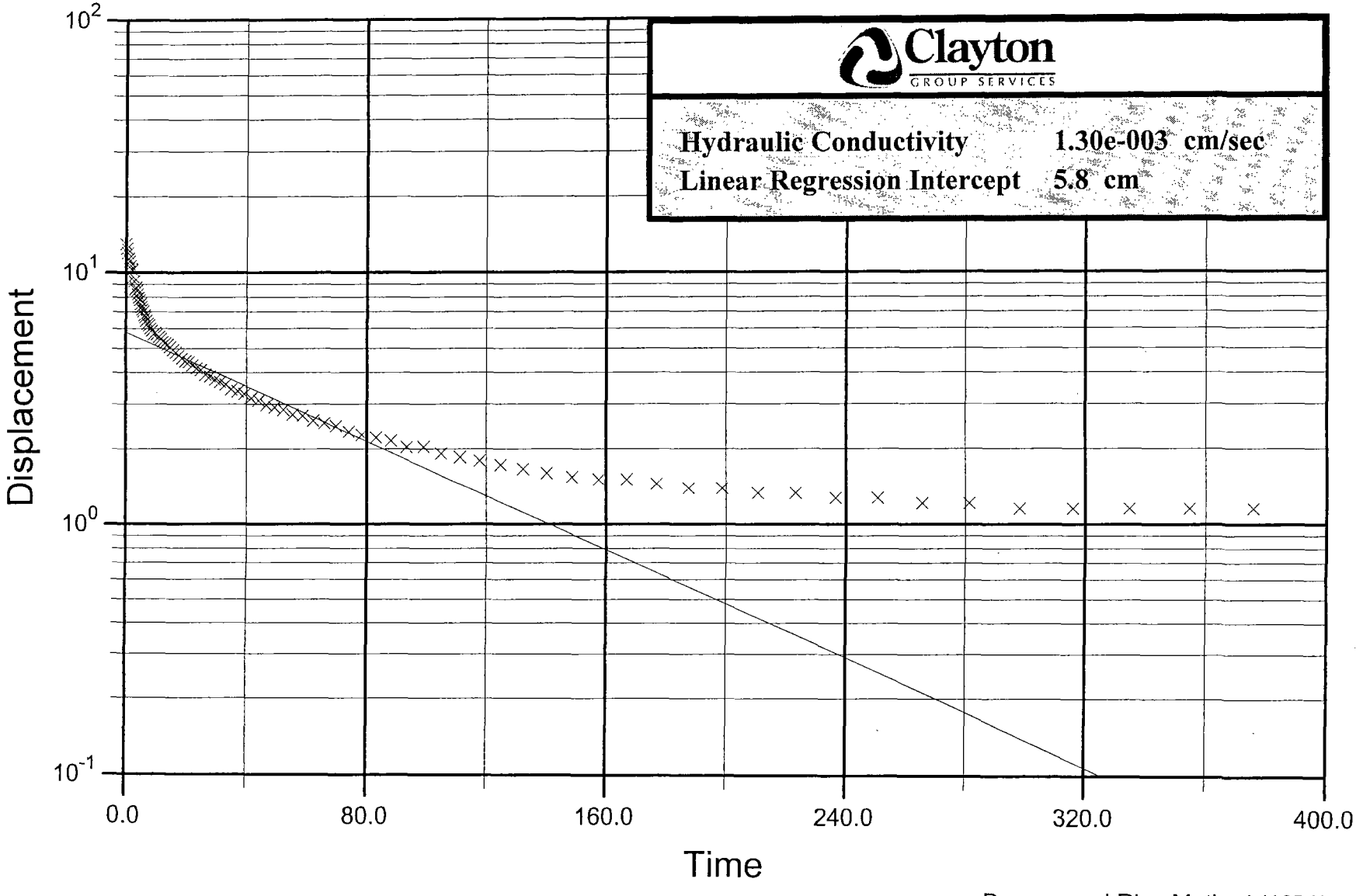
MW-1101D
64.5-73.5
9/9/02

= Sample Location
= Depth of sample in feet below top of casing (if applicable)
= Sample Date
NA = Not Analyzed
Values expressed in milligrams per liter (mg/L), except Oxygen Reduction Potential, which is expressed in milliVolts.

APPENDIX A

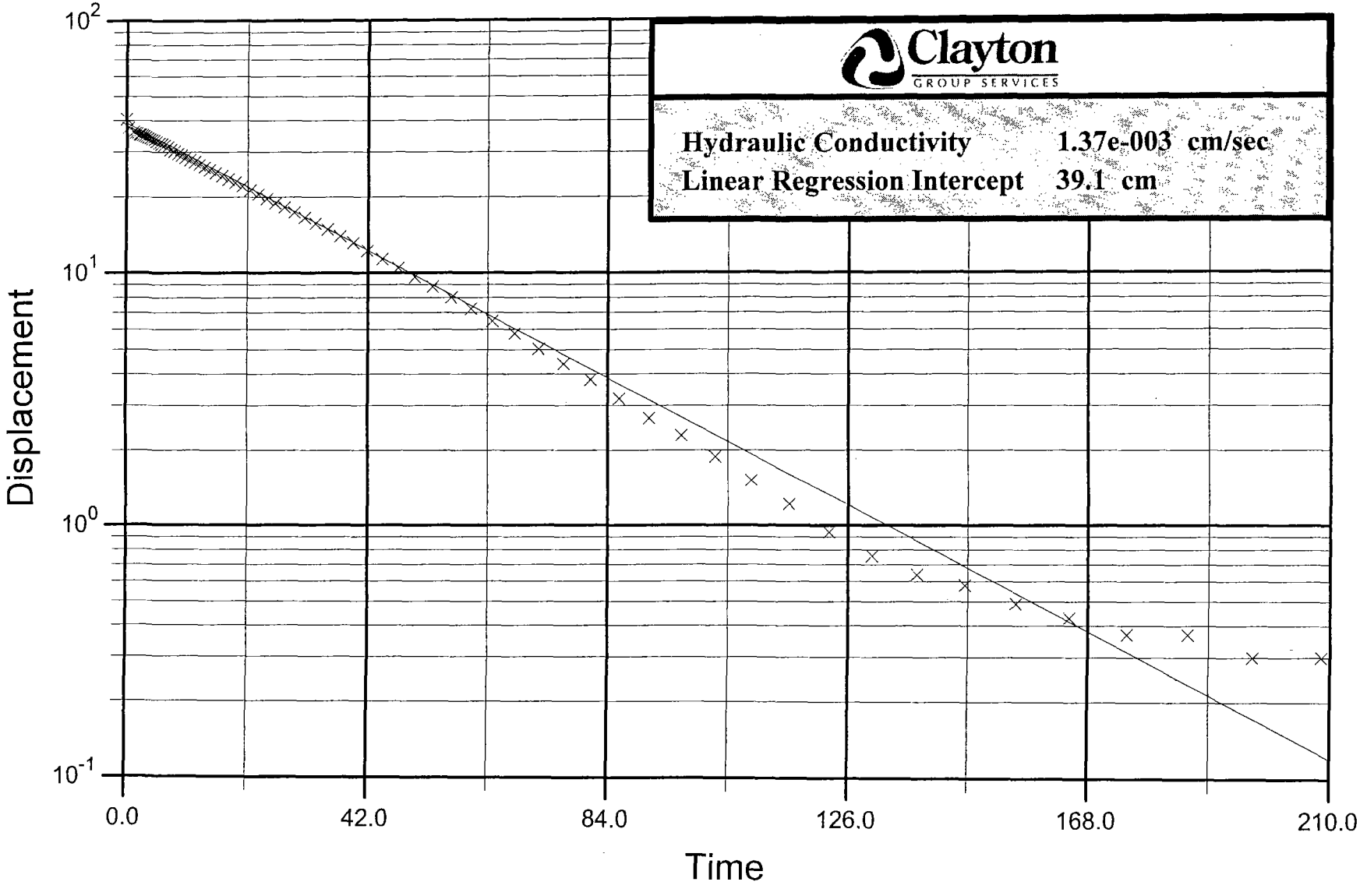
SLUG TESTS

MW1113S Rising Head Slug Test



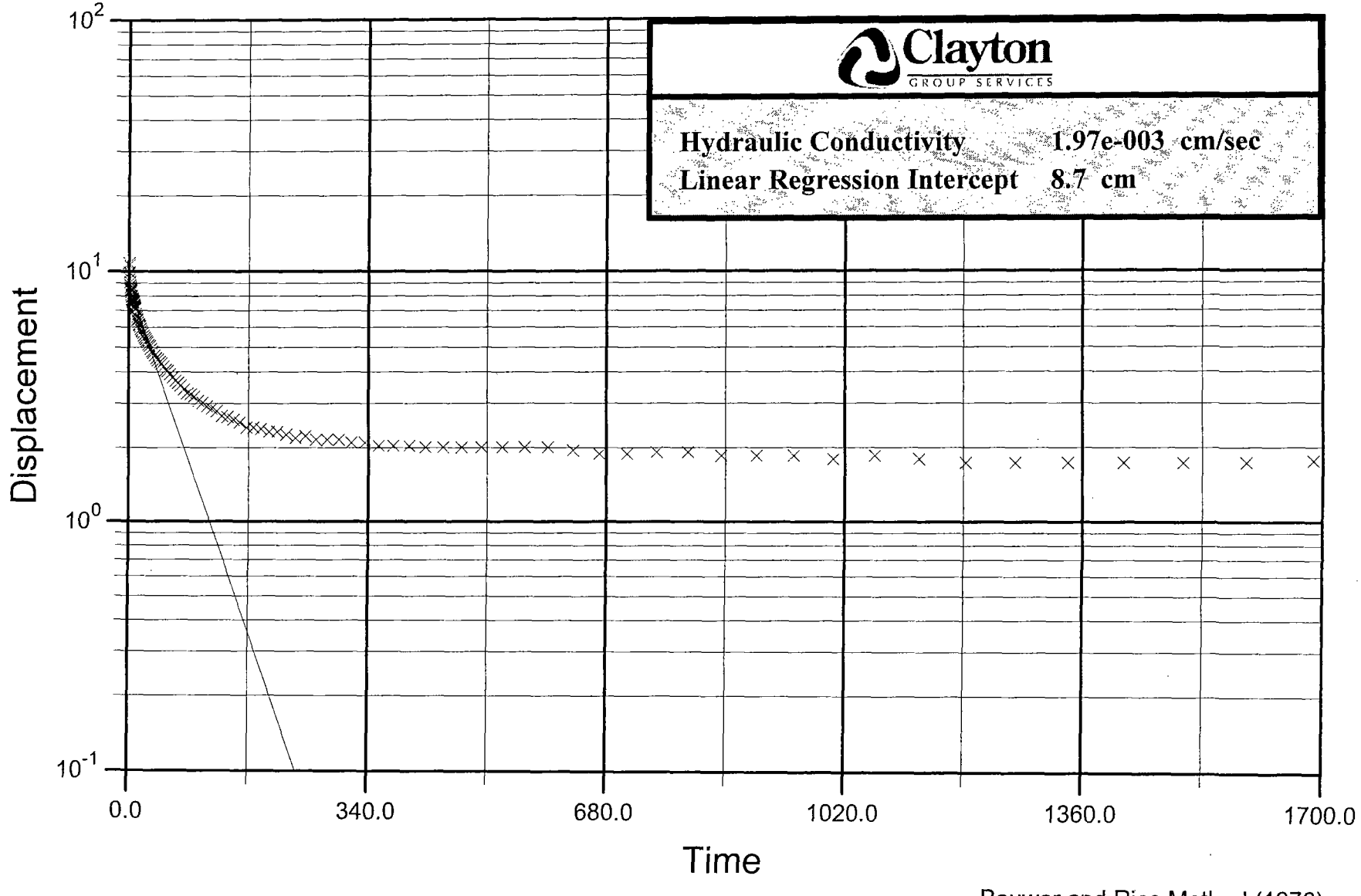
Bouwer and Rice Method (1976)

MW1113M Falling Head Slug Test



Bouwer and Rice Method (1976)

MW1113S Falling Head Slug Test



Bouwer and Rice Method (1976)

APPENDIX B

BIOCHLOR NATURAL ATTENUATION DECISION SUPPORT SYSTEM

BIOCHLOR Natural Attenuation Decision Support System

Version 2.0

Area 3 | Manhole E Source (Run Name)

TYPE OF CHLORINATED SOLVENT: Ethenes ◉ Ethanes ○

1. ADVECTION

Seepage Velocity*	Vs	9.9	(ft/yr)
or			
Hydraulic Conductivity	K	1.6E-03	(cm/sec)
Hydraulic Gradient	i	0.0015	(ft/ft)
Effective Porosity	n	0.25	(-)

2. DISPERSION

Alpha x*	30	(ft)
(Alpha y) / (Alpha x)*	0.1	(-)
(Alpha z) / (Alpha x)*	1.E-08	(-)

Calc. Alpha x

3. ADSORPTION

Retardation Factor* → R

or

Soil Bulk Density, rho	1.6	(kg/L)		
FractionOrganicCarbon, foc	2.7E-3	(-)		
Partition Coefficient	Koc			
PCE		(L/kg)	1.00	(-)
TCE	100	(L/kg)	2.70	(-)
DCE		(L/kg)	1.00	(-)
VC		(L/kg)	1.00	(-)
ETH		(L/kg)	1.00	(-)
Common R (used in model)* =			**1.00**	

4. BIOTRANSFORMATION

-1st Order Decay Coefficient*

Zone 1

	λ (1/yr)	half-life (yrs)	Yield
PCE → TCE	0.000		0.79
TCE → DCE	0.000		0.74
DCE → VC	0.000		0.64
VC → ETH	0.000		0.45

Zone 2

	λ (1/yr)	half-life (yrs)
PCE → TCE	0.000	
TCE → DCE	0.000	
DCE → VC	0.000	
VC → ETH	0.000	

λ HELP

5. GENERAL

Simulation Time*	35	(yr)
Modeled Area Width*	200	(ft)
Modeled Area Length*	900	(ft)
Zone 1 Length*	900	(ft)
Zone 2 Length*	0	(ft)

L, W

Zone 2= L - Zone 1

6. SOURCE DATA

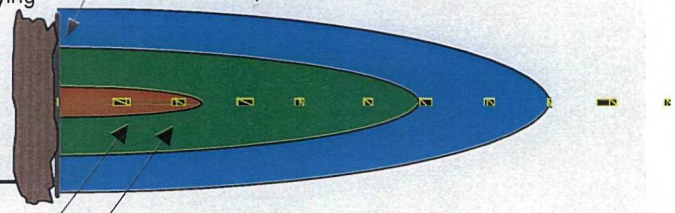
TYPE: Continuous Spatially-Varying

Source Options

Source Thickness in Sat. Zone* 2 (ft)

	Y1	Y2	Y3	k_s*
Width* (ft)	40	100		
Conc. (mg/L)*	C1	C2	C3	(1/yr)
PCE				0
TCE	.42	0.050		0
DCE				0
VC				0
ETH				0

Vertical Plane Source: Determine Source Well Location and Input Solvent Concentrations



View of Plume Looking Down

Observed Centerline Conc. at Monitoring Wells

7. FIELD DATA FOR COMPARISON

PCE Conc. (mg/L)											
TCE Conc. (mg/L)	.42	.317	.303	.26	.073						
DCE Conc. (mg/L)											
VC Conc. (mg/L)											
ETH Conc. (mg/L)											
Dist. from Source (ft)	0	80	120	130	290						

8. CHOOSE TYPE OF OUTPUT TO SEE:

RUN CENTERLINE | RUN ARRAY | Help | Restore Formulas | RESET | SEE OUTPUT | Paste Example

Data Input Instructions:

115 ← 1. Enter value directly....or

or ↑ 2. Calculate by filling in gray cells. Press Enter, then (C)

0.02

(To restore formulas, hit "Restore Formulas" button)

Variable* → Data used directly in model.

Test if Biotransformation is Occurring → Natural Attenuation Screening Protocol

Start Here → ○ PCE ◉ TCE ○ DCE ○ VC ○ ETH

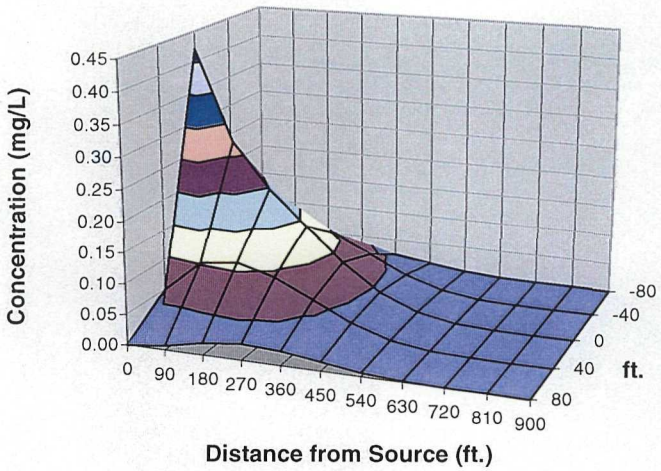
DISSOLVED SOLVENT CONCENTRATIONS IN PLUME

Transverse Distance (ft) ↓	Distance from Source (ft) 0	90	180	270	360	450	540	630	720	810	900
80	0.000	0.007	0.020	0.027	0.024	0.015	0.006	0.002	0.000	0.000	0.000
40	0.050	0.102	0.110	0.093	0.063	0.032	0.012	0.003	0.001	0.000	0.000
0	0.420	0.271	0.198	0.141	0.087	0.042	0.016	0.004	0.001	0.000	0.000
-40	0.050	0.102	0.110	0.093	0.063	0.032	0.012	0.003	0.001	0.000	0.000
-80	0.000	0.007	0.020	0.027	0.024	0.015	0.006	0.002	0.000	0.000	0.000
MASS RATE (mg/day)	-	-	-	-	-	-	-	-	-	-	-

Show No Degradation

Show Biotransformation

Time: 35 yr Target Level: 0.005 mg/L Displayed Model: Biotransformation Displayed Compound: TCE



Plume Mass (Order-of-Magnitude Accuracy)

See Gallons

Plume Mass If No Degradation	0.1	(Kg)
- Plume Mass If Biotransformation/Production	0.1	(Kg)
Mass Removed	0.0	(Kg)

If "Can't Calc.", make model area longer

% Biotransformed = +0.0%

% Change in Mass Rate = #VALUE! (source to edge)

See MGal

Current Volume of Ground Water in Plume	1.36	acre-ft
Flow Rate of Water Through Source Area	0.000	acre-ft/yr

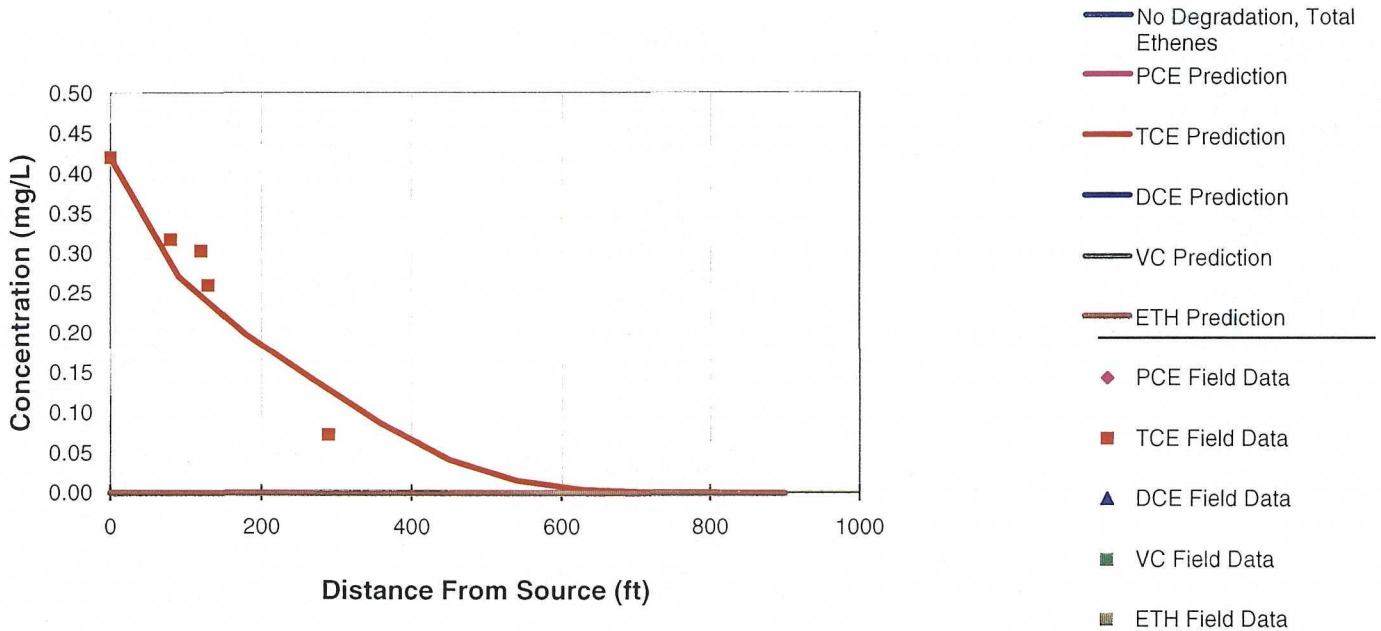
Compare to Pump and Treat

Pumping Rate		(gpm)
# Pore Volumes Removed Per Yr.	0.0	
# Pore Volumes to Clean-Up		
Clean-Up Time		(yr)

Plot All Data Plot Data > Target

Mass HELP To Centerline Return to Input

DISSOLVED CHLORINATED SOLVENT CONCENTRATIONS ALONG PLUME CENTERLINE



Log ⟺ Linear

Time:
35 Years

To Input

To Individual Compounds

217-782-5504

October 28, 2004

Arthur Bourlard, EH&S Coordinator
Lockformer
711 Ogden Avenue
Lisle, Illinois 60532-1399

Refer to: 0430555004 – DuPage County
Lisle/Lockformer
Superfund/Technical Reports

Dear Mr. Bourlard:

The Illinois Environmental Protection Agency (Illinois EPA) has reviewed Clayton's VOC *Additional Area 3 Investigation, received June 25, 2004.* Illinois EPA is responding per the First Amendment to Consent Order Section IX.E.2 ii, Item 3.

GENERAL COMMENTS

1. Manhole E, the source of contamination from the north-south sanitary sewer south of the Lockformer facility, is sufficiently delineated to propose and design a remedial system. Additional samples may need to be collected to determine the appropriate radius of influence for an SVE system, if this is the selected remedial technology.

2. Soil and groundwater analytical data that were collected after the *Supplemental VOC Investigation Report for Area 3, November 27, 2002* report was issued should be tabulated, compared with appropriate Tier 1 standards and included in this report. Laboratory data sheets should be provided as an attachment. Similarly, groundwater analytical data collected from bedrock wells RW1 through RW12 should be included in this report since there was no separate submittal of these data.

3. The IEPA does not agree with the conclusion that 42-inch sewer owned by the Downers Grove Sanitary Sewer District (DGSD) contributed TCE contamination to residential wells south of the Lockformer facility. See Specific Comment #14.

SPECIFIC COMMENTS

1. It would be beneficial to show on Figures 2-1 to 2-4 the depths where grab groundwater samples were collected.

2. Page 2-1, Figure 2-1, Section G-G'. Please indicate the approximate location of the groundwater table.

3. Page 2-1, Figure 2-1, Section B-B'. Please verify labels pointing to wells MW-1119M and MW-1119S.

4. Page 2-2, Figure 2-2, Section I-I'. Monitoring well MW-2129S is not shown on the reference map. Soil boring CSB2128 is not shown on cross-section I-I'. Please verify.

5. Page 2-3, Figure 2-3, Section C-C'. Soil boring CSB2112 is not shown on the reference map. Please verify.

6. Page 2-4, 1st paragraph. Sampling at the Ogden Corporate Center was performed to determine whether groundwater exiting the western boundary of Area 3 exceeds Tier 1 standards. Based on the groundwater flow direction, it appears that TCE detections in CSB2140, CSB2141, and CSB2142 are due to contamination present at the Lockformer property and not due to release from the sanitary sewer. Please incorporate this conclusion in the report.

7. Page 2-4, Soil sampling results are not shown for all of the data collected (i.e. CSB2142, CSB2413-CSB2415). Per general comment requirement, all the data should be included in this report.

8. Page 3-3, 2nd paragraph. The IEPA agrees that the two identified factors would have an impact on groundwater flow and that these factors complicate evaluation of groundwater flow. Please explain the groundwater flow pattern if the 650' contour line is closed as shown on Figure 3-3.

9. Page 3-3, 2nd paragraph. Figure 3-3, Please indicate why the 652.25' contour line is presented as inferred.

10. Figure 3-6, The extent of the mound in the vicinity of MW-2312S may be overestimated. Based on the groundwater elevations in well pair MW-2312S and MW-2312M, it appears that aquifer recharge due to leakage from the sewer could be the vertical inflow in a very localized area. If it is important to Lockformer to demonstrate that this mound is an impediment to groundwater flow, it would be important to better understand the extent of the mound based on empirical data.

11. Page 3-4, It appears that a regional gradient is more relevant for groundwater flow in the Silurian dolomite than a local gradient. The gradient for the Silurian dolomite used in the groundwater flow evaluation should be based on Figures 3.1 and 3.2,

presented in report titled *Additional Area 1 and 2 Investigations and Remedial Objectives Report, (March 5, 2004).*

12. Page 3-5, Vertical gradients should be averaged only using data from wells MW-2300S/D and MW-2301S/D since the magnitude of leakage at these locations is different than at MW-2312S/M. It appears that vertical gradients based on groundwater elevation data collected on February 5, 2004, in MW-2301S/D are very different than at any other time. As such, it may be inappropriate to include these data in averaging.

13. Page 3-7, For completeness of data, please include in this report analytical data obtained from bedrock wells RW1 through RW12 located south of Area 3.

14. The following arguments do not support the conclusion that the DGSD sewer contributed TCE contamination to the residential area south of Lockformer: 1) no TCE was detected in any of soil samples collected underneath the DGSD sewer, and 2) TCE groundwater concentrations underneath the sewer are lower than groundwater concentrations at the southern boundary of the Lockformer facility. The Illinois EPA is not disputing findings that several compounds detected in the soil underneath the DGSD sewer were not found at the Lockformer facility or that downward vertical gradients exist in the vicinity of DGSD sewer. The report should be revised to eliminate the conclusion that the DGSD sewer contributed TCE contamination to the residential wells. If necessary, the IEPA is willing to discuss the implications of the DGSD sewer leak on the performance of groundwater remediation system at the southern boundary of Area 3.

15. The IEPA does not agree with the statement that a TCE source concentration of 500 mg/l is needed to explain a 2-mile long plume. Evaluation of the Domenico equation shows that it is reasonable to expect a much longer plume in the bedrock aquifer than in the glacial sediment aquifer assuming the same hydraulic conductivity and hydraulic gradient. Due to the low effective porosity of bedrock aquifers, groundwater velocity in the bedrock is much higher than in the glacial sediments. Based on a significant difference in effective porosity, it is not unreasonable to assume an order of magnitude higher groundwater velocity in the bedrock than in the glacial sediments. The phenomenon of hydrodynamic dispersion accounts for contaminant dilution due to tortuous groundwater flow through the porous media. Assuming a same scale of observation for the bedrock and glacial sediments, much more significant lateral and vertical dispersion would occur in the glacial sediments due to more tortuous groundwater flow. Figure 3-13 shows that the lateral extent of the TCE plume in residential wells approximately coincides with the width of TCE-impacted groundwater south of Lockformer (MW-2131S and CSB2104). This may be indicative of limited lateral dispersion in the bedrock aquifer. On the other hand, longitudinal dispersion is proportional to groundwater velocity (Bear, 1972). This higher longitudinal dispersion would result in a plume reaching a receptor sooner than predicted by the groundwater velocity alone. In addition, no data has been provided so far to demonstrate TCE degradation in the bedrock aquifer south of Lockformer. All

of these factors indicate that the plume length may be significantly longer in the bedrock aquifer than it would be expected in the glacial sediments. The analytical data collected from wells RW1 through RW12 would be useful to determine whether the TCE distribution in groundwater is reasonable.

16. Figure 3-13, What is the source of groundwater contamination detected in MW1915?

If you have any questions or comments, please feel free to contact me at 217-782-5504.

Sincerely,

Stanley F. Komperda
State Sites Unit
Remedial Project Management Section
Bureau of Land

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